core1

```
       04jul10 14:24:39 User233765 Session D209.1
            $0.00    0.245 DialUnits File415
     $0.00  Estimated cost File415
     $1.07  INTERNET
     $1.07  Estimated cost this search
     $1.07  Estimated total session cost   0.245 DialUnits

SYSTEM:OS  - DIALOG OneSearch
  File   9:Business & Industry(R) Jul/1994-2010/Jul 02
         (c) 2010 Gale/Cengage
  File  15:ABI/Inform(R) 1971-2010/Jul 03
         (c) 2010 ProQuest Info&Learning
  File 160:Gale Group PROMT(R) 1972-1989
         (c) 1999 The Gale Group
  File 148:Gale Group Trade & Industry DB 1976-2010/Jul 02
         (c) 2010 Gale/Cengage
*File 148: CURRENT feature not working. See HELP NEWS148.
  File 275:Gale Group Computer DB(TM) 1983-2010/May 25
         (c) 2010 Gale/Cengage
  File 610:Business Wire 1999-2010/Jul 04
         (c) 2010 Business Wire.
*File 610: contains data from 3/99 forward.
 For archive data (1986-2/99) see File 810.
  File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
*File 810: contains data from 1986-1999.
 See File 610 for current data.

      Set  Items  Description
      ---  -----  -----------
```

? s (quote and order) (25n) ((bid and ask) () information) (25n) ((concentric (5n) bands (10n) (size or dimension))

```
>>>Unmatched parentheses
```

? s au=almeida,c?

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
>>>Prefix "AU" is undefined
               0  AU=ALMEIDA,C?

 15: ABI/Inform(R)_1971-2010/Jul 03
               0  AU=ALMEIDA,C?

160: Gale Group PROMT(R)_1972-1989
               0  AU=ALMEIDA,C?

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
               0  AU=ALMEIDA,C?

275: Gale Group Computer DB(TM)_1983-2010/May 25
               0  AU=ALMEIDA,C?
```

```
610: Business Wire_1999-2010/Jul 04
               0  AU=ALMEIDA,C?

810: Business Wire_1986-1999/Feb 28
>>>Prefix "AU" is undefined
               0  AU=ALMEIDA,C?

TOTAL: FILES 9,15,160 and ...
      S1       0  AU=ALMEIDA,C?
```

? s au=lussier, a?

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
>>>Prefix "AU" is undefined
               0  AU=LUSSIER, A?

 15: ABI/Inform(R)_1971-2010/Jul 03
               0  AU=LUSSIER, A?

160: Gale Group PROMT(R)_1972-1989
               0  AU=LUSSIER, A?

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
               0  AU=LUSSIER, A?

275: Gale Group Computer DB(TM)_1983-2010/May 25
               0  AU=LUSSIER, A?

610: Business Wire_1999-2010/Jul 04
               0  AU=LUSSIER, A?

810: Business Wire_1986-1999/Feb 28
>>>Prefix "AU" is undefined
               0  AU=LUSSIER, A?

TOTAL: FILES 9,15,160 and ...
      S2       0  AU=LUSSIER, A?
```

? s au=logue,j?

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
>>>Prefix "AU" is undefined
               0  AU=LOGUE,J?

 15: ABI/Inform(R)_1971-2010/Jul 03
               0  AU=LOGUE,J?

160: Gale Group PROMT(R)_1972-1989
               0  AU=LOGUE,J?

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
               0  AU=LOGUE,J?

275: Gale Group Computer DB(TM)_1983-2010/May 25
               0  AU=LOGUE,J?
```

```
610: Business Wire_1999-2010/Jul 04
               0  AU=LOGUE,J?

810: Business Wire_1986-1999/Feb 28
>>>Prefix "AU" is undefined
               0  AU=LOGUE,J?

TOTAL: FILES 9,15,160 and ...
      S3       0  AU=LOGUE,J?
```

? s au=faloni,d?

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
>>>Prefix "AU" is undefined
               0  AU=FALONI,D?

 15: ABI/Inform(R)_1971-2010/Jul 03
               0  AU=FALONI,D?

160: Gale Group PROMT(R)_1972-1989
               0  AU=FALONI,D?

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
               0  AU=FALONI,D?

275: Gale Group Computer DB(TM)_1983-2010/May 25
               0  AU=FALONI,D?

610: Business Wire_1999-2010/Jul 04
               0  AU=FALONI,D?

810: Business Wire_1986-1999/Feb 28
>>>Prefix "AU" is undefined
               0  AU=FALONI,D?

TOTAL: FILES 9,15,160 and ...
      S4       0  AU=FALONI,D?
```

? s pd>20030129

Processing
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Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
         1785600  PD>20030129

 15: ABI/Inform(R)_1971-2010/Jul 03
         3128136  PD>20030129

160: Gale Group PROMT(R)_1972-1989
               0  PD>20030129
```

```
148: Gale Group Trade & Industry DB_1976-2010/Jul 02
Processing
        10389423  PD>20030129

275: Gale Group Computer DB(TM)_1983-2010/May 25
         1052988  PD>20030129

610: Business Wire_1999-2010/Jul 04
         1501764  PD>20030129

810: Business Wire_1986-1999/Feb 28
               0  PD>20030129

TOTAL: FILES 9,15,160 and ...
      S517857911  PD>20030129
```

? s (quote and order) (25n) ((bid and ask) () information) (25n) ((concentric (5n) bands (10n) (size or dimension))

```
>>>Unmatched parentheses
```

? s (quote and order) (25n) ((bid and ask) () (information) (25n) ((concentric (5n) bands (10n) (size or dimension))

```
>>>Unmatched parentheses
```

? s (quote and order) (25n) ((bid and ask) () (information)) (25n) ((concentric (5n) bands) (10n) (size or dimension))

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
            1087  CONCENTRIC
           27771  BANDS
           12505  DIMENSION
          317255  SIZE
           63048  ASK
          116483  BID
         2839505  INFORMATION
            9578  QUOTE
          307666  ORDER
               0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                  (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
            3072  CONCENTRIC
           19956  BANDS
           58592  DIMENSION
          529557  SIZE
          174242  BID
          398507  ASK
         1770704  INFORMATION
           69926  QUOTE
          788705  ORDER
```

```
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
            334  CONCENTRIC
           1394  BANDS
           1847  DIMENSION
          41342  SIZE
           3990  ASK
          29070  BID
         273734  INFORMATION
            492  QUOTE
         147186  ORDER
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
           6698  CONCENTRIC
          47387  BANDS
          65824  DIMENSION
         895104  SIZE
         358112  ASK
         333400  BID
        6427093  INFORMATION
          67089  QUOTE
        1607722  ORDER
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
           1449  CONCENTRIC
           7186  BANDS
          12593  DIMENSION
         134861  SIZE
          27111  BID
          51236  ASK
         745424  INFORMATION
           7835  QUOTE
         171299  ORDER
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
           1188  CONCENTRIC
           8890  BANDS
           9671  DIMENSION
         145034  SIZE
          23806  BID
          32602  ASK
        1702317  INFORMATION
           9118  QUOTE
         251538  ORDER
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
            417  CONCENTRIC
           1942  BANDS
           4601  DIMENSION
          39152  SIZE
           9176  ASK
           9987  BID
```

```
         343866  INFORMATION
           2285  QUOTE
          84091  ORDER
              0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
         166323  QUOTE
        3358207  ORDER
         714099  BID
         916671  ASK
       14102643  INFORMATION
          14245  CONCENTRIC
         114526  BANDS
        2102305  SIZE
         165633  DIMENSION
      S6      0  (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) () (information)) (25n) ((concentric (5n) bands) (10n) (size or dimension))

Processing
Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
         116483  BID
          63048  ASK
        2839505  INFORMATION
           1087  CONCENTRIC
          27771  BANDS
         317255  SIZE
          12505  DIMENSION
              0  (BID AND
                 ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                 DIMENSION)
           9578  QUOTE
         307666  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
         174242  BID
         398507  ASK
        1770704  INFORMATION
           3072  CONCENTRIC
          19956  BANDS
         529557  SIZE
          58592  DIMENSION
              0  (BID AND
                 ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                 DIMENSION)
          69926  QUOTE
         788705  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                 (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
```

```
         29070  BID
          3990  ASK
        273734  INFORMATION
           334  CONCENTRIC
          1394  BANDS
         41342  SIZE
          1847  DIMENSION
             0  (BID AND
                ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                DIMENSION)
           492  QUOTE
        147186  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
        333400  BID
        358112  ASK
       6427093  INFORMATION
          6698  CONCENTRIC
         47387  BANDS
        895104  SIZE
         65824  DIMENSION
             0  (BID AND
                ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                DIMENSION)
         67089  QUOTE
       1607722  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
         27111  BID
         51236  ASK
        745424  INFORMATION
          1449  CONCENTRIC
          7186  BANDS
        134861  SIZE
         12593  DIMENSION
             0  (BID AND
                ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                DIMENSION)
          7835  QUOTE
        171299  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
         23806  BID
         32602  ASK
       1702317  INFORMATION
          1188  CONCENTRIC
          8890  BANDS
        145034  SIZE
          9671  DIMENSION
             0  (BID AND
                ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                DIMENSION)
          9118  QUOTE
        251538  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))
```

```
810: Business Wire_1986-1999/Feb 28
            9987  BID
            9176  ASK
          343866  INFORMATION
             417  CONCENTRIC
            1942  BANDS
           39152  SIZE
            4601  DIMENSION
               0  (BID AND
                  ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                  DIMENSION)
            2285  QUOTE
           84091  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                  (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
          166323  QUOTE
         3358207  ORDER
          714099  BID
          916671  ASK
        14102643  INFORMATION
           14245  CONCENTRIC
          114526  BANDS
         2102305  SIZE
          165633  DIMENSION
               0  (BID AND
                  ASK)(W)INFORMATION(25N)CONCENTRIC(5N)BANDS(10N)(SIZE OR
                  DIMENSION)
      S7       0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION))
                  (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) () (information or data)) (25n) (((concentric or circular) (5n) bands) (25n) (size or dimension))

Processing
Processing
Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          116483  BID
           63048  ASK
         2839505  INFORMATION
          803347  DATA
            1087  CONCENTRIC
            7561  CIRCULAR
           27771  BANDS
          317255  SIZE
           12505  DIMENSION
               0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                  CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            9578  QUOTE
          307666  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                  DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                  (SIZE OR DIMENSION))
```

```
 15: ABI/Inform(R)_1971-2010/Jul 03
          174242  BID
          398507  ASK
         1770704  INFORMATION
         1205632  DATA
            3072  CONCENTRIC
           19037  CIRCULAR
           19956  BANDS
          529557  SIZE
           58592  DIMENSION
               0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                  CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           69926  QUOTE
          788705  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                  DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                  (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
           29070  BID
            3990  ASK
          273734  INFORMATION
          282422  DATA
             334  CONCENTRIC
            1903  CIRCULAR
            1394  BANDS
           41342  SIZE
            1847  DIMENSION
               0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                  CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
             492  QUOTE
          147186  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                  DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                  (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          333400  BID
          358112  ASK
         6427093  INFORMATION
         3434722  DATA
            6698  CONCENTRIC
           36898  CIRCULAR
           47387  BANDS
          895104  SIZE
           65824  DIMENSION
               0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                  CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           67089  QUOTE
         1607722  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                  DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                  (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
           27111  BID
           51236  ASK
          745424  INFORMATION
          640816  DATA
            1449  CONCENTRIC
            3199  CIRCULAR
            7186  BANDS
```

```
           134861  SIZE
            12593  DIMENSION
                0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                   CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
             7835  QUOTE
           171299  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                   DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                   (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
            23806  BID
            32602  ASK
          1702317  INFORMATION
          1089123  DATA
             1188  CONCENTRIC
             4376  CIRCULAR
             8890  BANDS
           145034  SIZE
             9671  DIMENSION
                0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                   CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
             9118  QUOTE
           251538  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                   DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                   (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
             9987  BID
             9176  ASK
           343866  INFORMATION
           211081  DATA
              417  CONCENTRIC
             1982  CIRCULAR
             1942  BANDS
            39152  SIZE
             4601  DIMENSION
                0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                   CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
             2285  QUOTE
            84091  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                   DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
                   (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
           166323  QUOTE
          3358207  ORDER
           714099  BID
           916671  ASK
         14102643  INFORMATION
          7667143  DATA
            14245  CONCENTRIC
            74956  CIRCULAR
           114526  BANDS
          2102305  SIZE
           165633  DIMENSION
                0  (BID AND ASK)(W)(INFORMATION OR DATA)(25N)(CONCENTRIC OR
                   CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
     S8         0  (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION OR
                   DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (25N)
```

```
                (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) (10n) (information or data)) (25n) (((concentric or circular) (5n) bands) (25n) (size or dimension))

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
         116483  BID
          63048  ASK
        2839505  INFORMATION
         803347  DATA
           1087  CONCENTRIC
           7561  CIRCULAR
          27771  BANDS
         317255  SIZE
          12505  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           9578  QUOTE
         307666  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
         174242  BID
         398507  ASK
        1770704  INFORMATION
        1205632  DATA
           3072  CONCENTRIC
          19037  CIRCULAR
          19956  BANDS
         529557  SIZE
          58592  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
          69926  QUOTE
         788705  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
          29070  BID
           3990  ASK
         273734  INFORMATION
         282422  DATA
            334  CONCENTRIC
           1903  CIRCULAR
           1394  BANDS
          41342  SIZE
           1847  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            492  QUOTE
         147186  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))
```

```
148: Gale Group Trade & Industry DB_1976-2010/Jul 02
         333400  BID
         358112  ASK
        6427093  INFORMATION
        3434722  DATA
           6698  CONCENTRIC
          36898  CIRCULAR
          47387  BANDS
         895104  SIZE
          65824  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
          67089  QUOTE
        1607722  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
          27111  BID
          51236  ASK
         745424  INFORMATION
         640816  DATA
           1449  CONCENTRIC
           3199  CIRCULAR
           7186  BANDS
         134861  SIZE
          12593  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           7835  QUOTE
         171299  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
          23806  BID
          32602  ASK
        1702317  INFORMATION
        1089123  DATA
           1188  CONCENTRIC
           4376  CIRCULAR
           8890  BANDS
         145034  SIZE
           9671  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           9118  QUOTE
         251538  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
           9987  BID
           9176  ASK
         343866  INFORMATION
         211081  DATA
            417  CONCENTRIC
           1982  CIRCULAR
           1942  BANDS
```

```
           39152  SIZE
            4601  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            2285  QUOTE
           84091  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
          166323  QUOTE
         3358207  ORDER
          714099  BID
          916671  ASK
        14102643  INFORMATION
         7667143  DATA
           14245  CONCENTRIC
           74956  CIRCULAR
          114526  BANDS
         2102305  SIZE
          165633  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
      S9       0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) (10n) (information or data)) (25n) (((concentric or circular) (5n) (rings or bands)) (25n) (size or dimension))

Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          116483  BID
           63048  ASK
         2839505  INFORMATION
          803347  DATA
            1087  CONCENTRIC
            7561  CIRCULAR
           14117  RINGS
           27771  BANDS
          317255  SIZE
           12505  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
            9578  QUOTE
          307666  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
                  BANDS)) (25N) (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
          174242  BID
          398507  ASK
         1770704  INFORMATION
         1205632  DATA
```

```
         3072  CONCENTRIC
        19037  CIRCULAR
        19956  BANDS
        22467  RINGS
       529557  SIZE
        58592  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
        69926  QUOTE
       788705  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
        29070  BID
         3990  ASK
       273734  INFORMATION
       282422  DATA
          334  CONCENTRIC
         1903  CIRCULAR
         1394  BANDS
         2391  RINGS
        41342  SIZE
         1847  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
          492  QUOTE
       147186  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
       333400  BID
       358112  ASK
      6427093  INFORMATION
      3434722  DATA
         6698  CONCENTRIC
        36898  CIRCULAR
        47387  BANDS
        48441  RINGS
       895104  SIZE
        65824  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
        67089  QUOTE
      1607722  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
        27111  BID
        51236  ASK
       745424  INFORMATION
       640816  DATA
         1449  CONCENTRIC
         3199  CIRCULAR
         6866  RINGS
         7186  BANDS
       134861  SIZE
```

```
        12593  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
         7835  QUOTE
       171299  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
        23806  BID
        32602  ASK
      1702317  INFORMATION
      1089123  DATA
         1188  CONCENTRIC
         4376  CIRCULAR
         5328  RINGS
         8890  BANDS
       145034  SIZE
         9671  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
         9118  QUOTE
       251538  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
         9987  BID
         9176  ASK
       343866  INFORMATION
       211081  DATA
          417  CONCENTRIC
         1982  CIRCULAR
         1682  RINGS
         1942  BANDS
        39152  SIZE
         4601  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
         2285  QUOTE
        84091  ORDER
            0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
               OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
               BANDS)) (25N) (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
       166323  QUOTE
      3358207  ORDER
       714099  BID
       916671  ASK
     14102643  INFORMATION
      7667143  DATA
        14245  CONCENTRIC
        74956  CIRCULAR
       101292  RINGS
       114526  BANDS
      2102305  SIZE
       165633  DIMENSION
            0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
               OR CIRCULAR)(5N)(RINGS OR BANDS)(25N)(SIZE OR DIMENSION)
```

```
     S10       0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RINGS OR
                  BANDS)) (25N) (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) (10n) (information or data)) (25n) (((concentric or circular) (5n) bands) (25n) (size or dimension))

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          116483  BID
           63048  ASK
         2839505  INFORMATION
          803347  DATA
            1087  CONCENTRIC
            7561  CIRCULAR
           27771  BANDS
          317255  SIZE
           12505  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            9578  QUOTE
          307666  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
          174242  BID
          398507  ASK
         1770704  INFORMATION
         1205632  DATA
            3072  CONCENTRIC
           19037  CIRCULAR
           19956  BANDS
          529557  SIZE
           58592  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           69926  QUOTE
          788705  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
           29070  BID
            3990  ASK
          273734  INFORMATION
          282422  DATA
             334  CONCENTRIC
            1903  CIRCULAR
            1394  BANDS
           41342  SIZE
            1847  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
             492  QUOTE
          147186  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
```

```
                (25N) (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          333400  BID
          358112  ASK
         6427093  INFORMATION
         3434722  DATA
            6698  CONCENTRIC
           36898  CIRCULAR
           47387  BANDS
          895104  SIZE
           65824  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           67089  QUOTE
         1607722  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
           27111  BID
           51236  ASK
          745424  INFORMATION
          640816  DATA
            1449  CONCENTRIC
            3199  CIRCULAR
            7186  BANDS
          134861  SIZE
           12593  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            7835  QUOTE
          171299  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
           23806  BID
           32602  ASK
         1702317  INFORMATION
         1089123  DATA
            1188  CONCENTRIC
            4376  CIRCULAR
            8890  BANDS
          145034  SIZE
            9671  DIMENSION
               0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                  OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
            9118  QUOTE
          251538  ORDER
               0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                  (25N) (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
            9987  BID
            9176  ASK
          343866  INFORMATION
          211081  DATA
             417  CONCENTRIC
```

```
           1982  CIRCULAR
           1942  BANDS
          39152  SIZE
           4601  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
           2285  QUOTE
          84091  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
         166323  QUOTE
        3358207  ORDER
         714099  BID
         916671  ASK
       14102643  INFORMATION
        7667143  DATA
          14245  CONCENTRIC
          74956  CIRCULAR
         114526  BANDS
        2102305  SIZE
         165633  DIMENSION
              0  (BID AND ASK)(10N)(INFORMATION OR DATA)(25N)(CONCENTRIC
                 OR CIRCULAR)(5N)BANDS(25N)(SIZE OR DIMENSION)
     S11      0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS)
                 (25N) (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) (10n) (information or data)) and (((concentric or circular) (15n) bands) and (size or dimension))

Processing
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```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          63048  ASK
         116483  BID
         803347  DATA
        2839505  INFORMATION
            227  (BID AND ASK)(10N)(INFORMATION OR DATA)
           1087  CONCENTRIC
           7561  CIRCULAR
          27771  BANDS
              5  (CONCENTRIC OR CIRCULAR)(15N)BANDS
           9578  QUOTE
         317255  SIZE
          12505  DIMENSION
         307666  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                 (SIZE OR DIMENSION))

 15: ABI/Inform(R)_1971-2010/Jul 03
           3072  CONCENTRIC
          19037  CIRCULAR
```

```
            19956  BANDS
               33  (CONCENTRIC OR CIRCULAR)(15N)BANDS
           174242  BID
           398507  ASK
          1205632  DATA
          1770704  INFORMATION
             2221  (BID AND ASK)(10N)(INFORMATION OR DATA)
            69926  QUOTE
           529557  SIZE
            58592  DIMENSION
           788705  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                   OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                   (SIZE OR DIMENSION))

160: Gale Group PROMT(R)_1972-1989
             3990  ASK
            29070  BID
           273734  INFORMATION
           282422  DATA
               12  (BID AND ASK)(10N)(INFORMATION OR DATA)
              334  CONCENTRIC
             1903  CIRCULAR
             1394  BANDS
                4  (CONCENTRIC OR CIRCULAR)(15N)BANDS
              492  QUOTE
            41342  SIZE
             1847  DIMENSION
           147186  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                   OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                   (SIZE OR DIMENSION))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
           358112  ASK
           333400  BID
          3434722  DATA
          6427093  INFORMATION
             2300  (BID AND ASK)(10N)(INFORMATION OR DATA)
             6698  CONCENTRIC
            36898  CIRCULAR
            47387  BANDS
               69  (CONCENTRIC OR CIRCULAR)(15N)BANDS
            67089  QUOTE
           895104  SIZE
            65824  DIMENSION
          1607722  ORDER
                0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                   OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                   (SIZE OR DIMENSION))

275: Gale Group Computer DB(TM)_1983-2010/May 25
            27111  BID
            51236  ASK
           745424  INFORMATION
           640816  DATA
              171  (BID AND ASK)(10N)(INFORMATION OR DATA)
             1449  CONCENTRIC
             3199  CIRCULAR
             7186  BANDS
               11  (CONCENTRIC OR CIRCULAR)(15N)BANDS
             7835  QUOTE
```

```
        134861  SIZE
         12593  DIMENSION
        171299  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                (SIZE OR DIMENSION))

610: Business Wire_1999-2010/Jul 04
         23806  BID
         32602  ASK
       1089123  DATA
       1702317  INFORMATION
           209  (BID AND ASK)(10N)(INFORMATION OR DATA)
          1188  CONCENTRIC
          4376  CIRCULAR
          8890  BANDS
             7  (CONCENTRIC OR CIRCULAR)(15N)BANDS
          9118  QUOTE
        145034  SIZE
          9671  DIMENSION
        251538  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                (SIZE OR DIMENSION))

810: Business Wire_1986-1999/Feb 28
          9176  ASK
          9987  BID
        211081  DATA
        343866  INFORMATION
            78  (BID AND ASK)(10N)(INFORMATION OR DATA)
           417  CONCENTRIC
          1982  CIRCULAR
          1942  BANDS
             1  (CONCENTRIC OR CIRCULAR)(15N)BANDS
          2285  QUOTE
         39152  SIZE
          4601  DIMENSION
         84091  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                (SIZE OR DIMENSION))

TOTAL: FILES 9,15,160 and ...
        166323  QUOTE
       3358207  ORDER
        714099  BID
        916671  ASK
      14102643  INFORMATION
       7667143  DATA
          5218  (BID AND ASK)(10N)(INFORMATION OR DATA)
         14245  CONCENTRIC
         74956  CIRCULAR
        114526  BANDS
           130  (CONCENTRIC OR CIRCULAR)(15N)BANDS
       2102305  SIZE
        165633  DIMENSION
     S12     0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS) AND
                (SIZE OR DIMENSION))
```

? s (quote and order) and ((bid and ask) (10n) (information or data))

Processing
Processing
Processing
Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          63048  ASK
         116483  BID
         803347  DATA
        2839505  INFORMATION
            227  (BID AND ASK)(10N)(INFORMATION OR DATA)
           9578  QUOTE
         307666  ORDER
             15  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA))

 15: ABI/Inform(R)_1971-2010/Jul 03
         174242  BID
         398507  ASK
        1205632  DATA
        1770704  INFORMATION
           2221  (BID AND ASK)(10N)(INFORMATION OR DATA)
          69926  QUOTE
         788705  ORDER
            428  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA))

160: Gale Group PROMT(R)_1972-1989
           3990  ASK
          29070  BID
         273734  INFORMATION
         282422  DATA
             12  (BID AND ASK)(10N)(INFORMATION OR DATA)
            492  QUOTE
         147186  ORDER
              0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA))

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
Processing
         358112  ASK
         333400  BID
        3434722  DATA
        6427093  INFORMATION
           2300  (BID AND ASK)(10N)(INFORMATION OR DATA)
          67089  QUOTE
        1607722  ORDER
            184  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                 OR DATA))

275: Gale Group Computer DB(TM)_1983-2010/May 25
          27111  BID
          51236  ASK
         745424  INFORMATION
         640816  DATA
            171  (BID AND ASK)(10N)(INFORMATION OR DATA)
           7835  QUOTE
```

```
        171299  ORDER
            21  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA))

610: Business Wire_1999-2010/Jul 04
         23806  BID
         32602  ASK
       1089123  DATA
       1702317  INFORMATION
           209  (BID AND ASK)(10N)(INFORMATION OR DATA)
          9118  QUOTE
        251538  ORDER
             4  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA))

810: Business Wire_1986-1999/Feb 28
          9176  ASK
          9987  BID
        211081  DATA
        343866  INFORMATION
            78  (BID AND ASK)(10N)(INFORMATION OR DATA)
          2285  QUOTE
         84091  ORDER
             0  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA))

TOTAL: FILES 9,15,160 and ...
        166323  QUOTE
       3358207  ORDER
        714099  BID
        916671  ASK
      14102643  INFORMATION
       7667143  DATA
          5218  (BID AND ASK)(10N)(INFORMATION OR DATA)
     S13   652  (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMATION
                OR DATA))
```

? s (concentric or circular) (15n) (rings or bands)

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          1087  CONCENTRIC
          7561  CIRCULAR
         14117  RINGS
         27771  BANDS
            84  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

 15: ABI/Inform(R)_1971-2010/Jul 03
          3072  CONCENTRIC
         19037  CIRCULAR
         22467  RINGS
         19956  BANDS
           363  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

160: Gale Group PROMT(R)_1972-1989
           334  CONCENTRIC
          1903  CIRCULAR
          2391  RINGS
```

```
          1394  BANDS
            39  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          6698  CONCENTRIC
         36898  CIRCULAR
         48441  RINGS
         47387  BANDS
           546  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

275: Gale Group Computer DB(TM)_1983-2010/May 25
          1449  CONCENTRIC
          3199  CIRCULAR
          6866  RINGS
          7186  BANDS
           111  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

610: Business Wire_1999-2010/Jul 04
          1188  CONCENTRIC
          4376  CIRCULAR
          5328  RINGS
          8890  BANDS
            25  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

810: Business Wire_1986-1999/Feb 28
           417  CONCENTRIC
          1982  CIRCULAR
          1682  RINGS
          1942  BANDS
             9  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)

TOTAL: FILES 9,15,160 and ...
         14245  CONCENTRIC
         74956  CIRCULAR
        101292  RINGS
        114526  BANDS
     S14  1177  (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)
```

? s (quote and order) and (bid and ask)

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
          9578  QUOTE
         63048  ASK
        116483  BID
        307666  ORDER
           129  (QUOTE AND ORDER) AND (BID AND ASK)

 15: ABI/Inform(R)_1971-2010/Jul 03
         69926  QUOTE
        174242  BID
        398507  ASK
        788705  ORDER
          3883  (QUOTE AND ORDER) AND (BID AND ASK)

160: Gale Group PROMT(R)_1972-1989
           492  QUOTE
          3990  ASK
         29070  BID
        147186  ORDER
```

```
               0  (QUOTE AND ORDER) AND (BID AND ASK)

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
           67089  QUOTE
          358112  ASK
          333400  BID
         1607722  ORDER
             849  (QUOTE AND ORDER) AND (BID AND ASK)

275: Gale Group Computer DB(TM)_1983-2010/May 25
            7835  QUOTE
           27111  BID
           51236  ASK
          171299  ORDER
             108  (QUOTE AND ORDER) AND (BID AND ASK)

610: Business Wire_1999-2010/Jul 04
            9118  QUOTE
           23806  BID
           32602  ASK
          251538  ORDER
              23  (QUOTE AND ORDER) AND (BID AND ASK)

810: Business Wire_1986-1999/Feb 28
            2285  QUOTE
            9176  ASK
            9987  BID
           84091  ORDER
               3  (QUOTE AND ORDER) AND (BID AND ASK)

TOTAL: FILES 9,15,160 and ...
          166323  QUOTE
         3358207  ORDER
          714099  BID
          916671  ASK
     S15    4995  (QUOTE AND ORDER) AND (BID AND ASK)
```

? ds

```
Set   File    Items   Description
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S1                0   AU=ALMEIDA,C?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S2                0   AU=LUSSIER, A?
        9         0
       15         0
      160         0
```

```
      148         0
      275         0
      610         0
      810         0
S3                0   AU=LOGUE,J?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S4                0   AU=FALONI,D?
        9   1785600
       15   3128136
      160         0
      148  10389423
      275   1052988
      610   1501764
      810         0
S5         17857911   PD>20030129
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S6                0   (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATI-
                  ON)) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMEN-
                  SION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S7                0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION-
                  )) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSI-
                  ON))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S8                0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (-
                  25N) (SIZE OR DIMENSION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S9                0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                  ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                  S) (25N) (SIZE OR DIMENSION))
        9         0
```

```
        15         0
       160         0
       148         0
       275         0
       610         0
       810         0
S10                0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                   ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RIN-
                   GS OR BANDS)) (25N) (SIZE OR DIMENSION))
         9         0
        15         0
       160         0
       148         0
       275         0
       610         0
       810         0
S11                0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                   ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                   S) (25N) (SIZE OR DIMENSION))
         9         0
        15         0
       160         0
       148         0
       275         0
       610         0
       810         0
S12                0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                   ION OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS)
                    AND (SIZE OR DIMENSION))
         9        15
        15       428
       160         0
       148       184
       275        21
       610         4
       810         0
S13              652   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                   ION OR DATA))
         9        84
        15       363
       160        39
       148       546
       275       111
       610        25
       810         9
S14             1177   (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)
         9       129
        15      3883
       160         0
       148       849
       275       108
       610        23
       810         3
S15             4995   (QUOTE AND ORDER) AND (BID AND ASK)
```

? s s14 and s15

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
             84  S14
```

```
            129  S15
              0  S14 AND S15

 15: ABI/Inform(R)_1971-2010/Jul 03
            363  S14
           3883  S15
              2  S14 AND S15

160: Gale Group PROMT(R)_1972-1989
              0  S15
             39  S14
              0  S14 AND S15

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
            546  S14
            849  S15
              0  S14 AND S15

275: Gale Group Computer DB(TM)_1983-2010/May 25
            111  S14
            108  S15
              0  S14 AND S15

610: Business Wire_1999-2010/Jul 04
             25  S14
             23  S15
              0  S14 AND S15

810: Business Wire_1986-1999/Feb 28
              9  S14
              3  S15
              0  S14 AND S15

TOTAL: FILES 9,15,160 and ...
           1177  S14
           4995  S15
     S16      2  S14 AND S15
```

? s s16 not s5

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
              0  S16
        1785600  S5
              0  S16 NOT S5

 15: ABI/Inform(R)_1971-2010/Jul 03
              2  S16
        3128136  S5
              0  S16 NOT S5

160: Gale Group PROMT(R)_1972-1989
              0  S16
              0  S5
              0  S16 NOT S5

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
              0  S16
       10389423  S5
              0  S16 NOT S5
```

```
275: Gale Group Computer DB(TM)_1983-2010/May 25
               0  S16
         1052988  S5
               0  S16 NOT S5

610: Business Wire_1999-2010/Jul 04
               0  S16
         1501764  S5
               0  S16 NOT S5

810: Business Wire_1986-1999/Feb 28
               0  S16
               0  S5
               0  S16 NOT S5

TOTAL: FILES 9,15,160 and ...
               2  S16
        17857911  S5
     S17       0  S16 NOT S5
```

? t s16/6,k/all

Dialog eLink: USPTO Full Text Retrieval Options

16/6,K/1 (Item 1 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

06754143 2015900091
****USE FORMAT 7 OR 9 FOR FULL TEXT****
SCANA Corporation Analyst Meeting - Final

Apr 8, 2010
Word Count: 29257
Text:

...Fox. When they conclude their remarks, if you have questions for them would you please **ask** those questions at that time. We want to try and get them down to the...

...a lot of things that you need to come on, pumps, valves, diesel generators in **order** for that plant to maintain a safe configuration going forward.

The best way to deal...

...standpoint rely on things like gravity and convection. We still spend $100 million plus in **order** to prove that water does flow downstream, but that's a regulatory process that we...

...maintenance. So, these plants from the word go from the design outward are designed in **order** to make sure that they're going to run at the very high capacity factors...

...is reinforced concrete, heavily reinforced concrete, but reinforced concrete nevertheless.

The reinforced concrete design, in **order** to get it aircraft-proof, needed to be significantly expanding the footprint and changing the...

...and make some changes -- relatively minor changes, in the design that we were proposing in **order** to speed up the licensing process.

You see there on the right probably a little...

...increased the thickness of the steel that sandwiches the concrete and put some anchors in **order** to make sure that the different parts of the modules basically communicated better with each...

...examinations all the way through the construction cycle so the first few units, again, in **order** to make sure that not only the design is adequate but the as-built design...the way to first principles in those reviews.

That scrutiny, I think, is essential in **order** to maintain the confidence of the public in this technology. Can we do it faster...

...Interestingly enough, I don't know whether most of you realize that Westinghouse did not **bid** on that project. The reason that we did not **bid** in Finland is because we did not have a licensed design and we did not...also get an opportunity to see what we're doing.

If you look at this **quote**, this came from their publication after the tour. It says the tour left no doubt...

...to tour our facility to see what we're doing and to be able to **ask** questions. That's our commitment to you, and we will continue those efforts because I...

...is safe. If it takes them a couple of extra months or a year to **ask** questions, in their mind to prove to the public that it's safe, then that...

...inside of this building.

So I'm able to do the welding of these plates, **circular** plates and there's three of these **rings** that sit on top of the bottom bowl and then a top bowl that goes...number of the large components, as I track through this, color coded as the purchase **order** was issued; I would put one color. And then as we have then personally visited...

...code it a different color.

Then every one of those, our equipment as the purchase **order** has already been issued and we visited those sites. This lays out for both Unit ...

...it goes down two separate and distinct paths. They go through a process where they **ask** questions and these are what we call requests for additional information. They **ask** hundreds of questions and as Ron alluded to, we're down to about the final...on line in 1984, almost a third of that cost was financing cost.

So, in **order** to avoid that we helped participate in drafting the Base Load Review Act which was...

...already been decided. That won't be renegotiated unless we decide to go in and **ask** for that to go up; that's something that's at our

determination.

At the...you look at this third column, this is the forecast that was approved in the **order**. I'm going to kind of start from the bottom and work up.

If we...

...of our clean air interstate rules and making sure we meet all their expectations. In **order** to do that we've had to install two very expensive scrubbers on two of...

...piece of that increase so we'd have absolute support in terms of the regulatory **order** that may come out as to why the growth in those three pieces and how...

...and the financial health of our company. We've got to have those buyers in **order** to be successful and make sure we've got plenty of power for our customers...
...witnesses up on the stand, go through the testimony and give them a chance to **ask** questions.

They want to make sure that they fulfill their responsibilities and even though the parties may have reached a settlement, they want their opportunity to **ask** us under oath, on the record, the questions that they have and we're more...to Q&A. I know we've got microphones available for those who want to **ask** questions. But --.

UNIDENTIFIED AUDIENCE MEMBER: Thank you. In the slides about the cost of the...

...the risk off the table.

UNIDENTIFIED AUDIENCE MEMBER: So would it be too early to **ask** what -- how much of that 50% firm that was guesstimated earlier moved over to the...

Dialog eLink: USPTO Full Text Retrieval Options

16/6,K/2 (Item 2 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

06407569 1780004921

****USE FORMAT 7 OR 9 FOR FULL TEXT****

SEN. THOMAS R. CARPER, D-DEL. HOLDS A HEARING ON FROM STRATEGY TO IMPLEMENTATION: STRENGTHENING U.S.-PAKISTAN RELATIONS

Jul 7, 2009
Word Count: 23918
Text:

...AND INTERNATIONAL AFFAIRS, HARVARD UNIVERSITY JOHN KENNEDY SCHOOL OF GOVERNMENT

(*) CARPER: Subcommittee will come to **order**. I want to welcome a -- not an interloper, but a very good friend, Senator Udall... ...of our Joint Chiefs of Staff, has called the border region between Pakistan and Afghanistan, **quote** -- and this is his **quote** -- "The site of planning for the next attack," unquote, on the United States.

General David...

...oversees the wars in both Iraq and Afghanistan, said recently that Pakistan has become the, **quote** -- he calls it "The nerve center," close **quote**, of Al Qaeda's global operations, allowing it to re-establish its organizational structure, build...all of the many countries who have relationships and interests in Pakistan and Afghanistan, in **order** to get us all sort of on the same page politically speaking. And complementing that...U.S. lacked a comprehensive plan, encompassing all elements of national power. Let me just **ask**: What progress ...this is my opening statement.

CARPER: Fair enough. Would you like to go ahead and **ask** -- **ask** a question, **ask** him some questions?

AKAKA: Yes.

CARPER: You're recognized for an hour-and-a-half...Washington, the National Security Council is taking the lead in pulling together sort of higher **order** metrics that we will measure against on a regular basis and -- and report both to...be confronted.

Yesterday, it was reported that President Zardari said he wants to create a, **quote**, "Pakistan where militancy is defeated," close **quote**. And Pakistan army chief of staff General Kiyani was quoted as saying that, **quote**, "The immediate internal threat," close **quote**, of Taliban extremism was greater than any external threat, which was understood to be a...

...Taliban as being a threat to -- to their government and society, I mean, to the **order** of, you know, 30 percent to 80 percent.

And I've had, as I'm...

...shura from meeting openly in Quetta, Pakistan?

JONES: I think -- I mean, I think in **order** to fully address your question, we'd have to -- I would want to go into...you before us here this afternoon to continue this conversation.

And I'm going to **ask** you to please stick to your five minutes. And if you go much beyond that, I'll have to rein you in. But I'll **ask** you to stick to that, so we'll be sure to be able to **ask** you some good questions later on.

Ms. Curtis, I understand you're just back from...military officials describe their adversaries along the Afghanistan-Pakistan border in general terms such as, **quote**, "the enemy," while in the same sentence proposing to isolate specific irreconcilable militants from specific...

...s committing terrorism abroad, committing terrorism against international targets in Pakistan and Afghanistan, or in **order** to consolidate their own control over these areas, committing violence against the traditional tribal authorities...groups had already switched sides.

In other words, the state may have succeeded in its **bid** to

reconcile the leaders of some groups, but what good is a leader with no...

...take off their uniforms, to take AK-47s, to look like locals, and to fight, **quote**, unquote, "as Taliban" with the Taliban against these foreign fighters. So this story should show...help strengthen civilian control and supremacy inside Pakistan.

CARPER: Mr. Nawaz, I'm going to **ask** you to wrap up your testimony, please.

NAWAZ: Yes, sir.

The Pakistani diaspora can provide...of intimidation and illustrating the erosion of civil society and the collapse of law and **order**.

A drop in killings might simply indicate that most mullahs have been killed or driven...has any final questions or comments. I have a number of questions I want to **ask** before we conclude. I think we're going to vote at about 4:45, starting...

...more questions.

And, Senator Burris, any comments or questions you'd -- you'd like to **ask** of these folks, feel free?

BURRIS: Thank you, Mr. Chairman.

And I'm listening to...would suggest that one easy way to think about it is -- is almost like the **concentric rings** of a target.
And if at the center of the target you have the groups...killing 160 people in India in November 2008...

CARPER: Let me just -- let me just **ask** -- interrupt you -- excuse me for interrupting. But do you think that attack had anything to ...

...Larssen, for you, for maybe Mr. Schmidle, and for Ms. Curtis.
I'm going to **ask** you to try to be brief. We're going to start voting in about five...

...nuclear establishment are not immune to rising levels of extremism in Pakistan. And let me **ask** you: Do you believe that increasing levels of extremism create or exacerbate the insider threat...s well regarded and thoughtful, one of the things I like to do is to **ask** you to -- to say -- let's just go down the list really quickly.

And, Ms...and questions from my colleagues. If you have any of those questions, I would just **ask** for your cooperation in providing prompt responses to those questions that might be submitted for...

? s market (10n) price (10n) (data or information)

Processing
Processing
Processing

Processing
Processing
Processing

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
         494079  PRICE
        2137037  MARKET
         803347  DATA
        2839505  INFORMATION
           2262  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

 15: ABI/Inform(R)_1971-2010/Jul 03
         884881  PRICE
        1893841  MARKET
        1205632  DATA
        1770704  INFORMATION
          10429  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

160: Gale Group PROMT(R)_1972-1989
          92231  PRICE
         343449  MARKET
         282422  DATA
         273734  INFORMATION
           1372  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
Processing
        2221280  PRICE
        4908942  MARKET
        3434722  DATA
        6427093  INFORMATION
          22057  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

275: Gale Group Computer DB(TM)_1983-2010/May 25
         263234  PRICE
         569610  MARKET
         640816  DATA
         745424  INFORMATION
           1620  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

610: Business Wire_1999-2010/Jul 04
         304643  PRICE
        1111921  MARKET
        1089123  DATA
        1702317  INFORMATION
           4370  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

810: Business Wire_1986-1999/Feb 28
         133594  PRICE
         324872  MARKET
         211081  DATA
         343866  INFORMATION
            899  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)

TOTAL: FILES 9,15,160 and ...
       11289672  MARKET
        4393942  PRICE
        7667143  DATA
       14102643  INFORMATION
     S18  43009  MARKET (10N) PRICE (10N) (DATA OR INFORMATION)
```

? s quote and order and bid and ask

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
           9578  QUOTE
          63048  ASK
         116483  BID
         307666  ORDER
            129  QUOTE AND ORDER AND BID AND ASK

 15: ABI/Inform(R)_1971-2010/Jul 03
          69926  QUOTE
         174242  BID
         398507  ASK
         788705  ORDER
           3883  QUOTE AND ORDER AND BID AND ASK

160: Gale Group PROMT(R)_1972-1989
            492  QUOTE
           3990  ASK
          29070  BID
         147186  ORDER
              0  QUOTE AND ORDER AND BID AND ASK

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          67089  QUOTE
         358112  ASK
         333400  BID
        1607722  ORDER
            849  QUOTE AND ORDER AND BID AND ASK

275: Gale Group Computer DB(TM)_1983-2010/May 25
           7835  QUOTE
          27111  BID
          51236  ASK
         171299  ORDER
            108  QUOTE AND ORDER AND BID AND ASK

610: Business Wire_1999-2010/Jul 04
           9118  QUOTE
          23806  BID
          32602  ASK
         251538  ORDER
             23  QUOTE AND ORDER AND BID AND ASK

810: Business Wire_1986-1999/Feb 28
           2285  QUOTE
           9176  ASK
           9987  BID
          84091  ORDER
              3  QUOTE AND ORDER AND BID AND ASK

TOTAL: FILES 9,15,160 and ...
         166323  QUOTE
        3358207  ORDER
         714099  BID
         916671  ASK
     S19   4995  QUOTE AND ORDER AND BID AND ASK
```

? s (band? or ring?) and s18

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
           2262  S18
         108792  BAND?
          52655  RING?
            169  (BAND? OR RING?) AND S18

 15: ABI/Inform(R)_1971-2010/Jul 03
          10429  S18
         174311  BAND?
          96326  RING?
            958  (BAND? OR RING?) AND S18

160: Gale Group PROMT(R)_1972-1989
           1372  S18
          11856  BAND?
           8812  RING?
             11  (BAND? OR RING?) AND S18

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          22057  S18
         408279  BAND?
         198520  RING?
           1526  (BAND? OR RING?) AND S18

275: Gale Group Computer DB(TM)_1983-2010/May 25
           1620  S18
         104370  BAND?
          44619  RING?
            239  (BAND? OR RING?) AND S18

610: Business Wire_1999-2010/Jul 04
           4370  S18
          84731  BAND?
          22946  RING?
            191  (BAND? OR RING?) AND S18

810: Business Wire_1986-1999/Feb 28
            899  S18
          26736  BAND?
          12224  RING?
             58  (BAND? OR RING?) AND S18

TOTAL: FILES 9,15,160 and ...
         919075  BAND?
         436102  RING?
          43009  S18
     S20   3152  (BAND? OR RING?) AND S18
```

? s s19 and s20

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
            169  S20
            129  S19
              4  S19 AND S20

 15: ABI/Inform(R)_1971-2010/Jul 03
```

```
             958  S20
            3883  S19
              22  S19 AND S20

160: Gale Group PROMT(R)_1972-1989
               0  S19
              11  S20
               0  S19 AND S20

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
            1526  S20
             849  S19
              28  S19 AND S20

275: Gale Group Computer DB(TM)_1983-2010/May 25
             239  S20
             108  S19
               8  S19 AND S20

610: Business Wire_1999-2010/Jul 04
              23  S19
             191  S20
               0  S19 AND S20

810: Business Wire_1986-1999/Feb 28
               3  S19
              58  S20
               0  S19 AND S20

TOTAL: FILES 9,15,160 and ...
            4995  S19
            3152  S20
     S21      62  S19 AND S20
```

? s s21 not s5

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
               4  S21
         1785600  S5
               0  S21 NOT S5

 15: ABI/Inform(R)_1971-2010/Jul 03
              22  S21
         3128136  S5
               3  S21 NOT S5

160: Gale Group PROMT(R)_1972-1989
               0  S21
               0  S5
               0  S21 NOT S5

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
              28  S21
        10389423  S5
              13  S21 NOT S5

275: Gale Group Computer DB(TM)_1983-2010/May 25
               8  S21
         1052988  S5
```

```
               7  S21 NOT S5

610: Business Wire_1999-2010/Jul 04
               0  S21
         1501764  S5
               0  S21 NOT S5

810: Business Wire_1986-1999/Feb 28
               0  S21
               0  S5
               0  S21 NOT S5

TOTAL: FILES 9,15,160 and ...
              62  S21
        17857911  S5
     S22      23  S21 NOT S5
```

? **rd**

```
     S23      22  RD  (unique items)
```

? **t /6,k/1-10**

Dialog eLink: USPTO Full Text Retrieval Options

23/6,K/1 (Item 1 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

01165285 98-14680

****USE FORMAT 7 OR 9 FOR FULL TEXT****

Circadian rhythms: The effects of global market integration in the currency trading industry

Fourth Quarter 1995 **Length:** 30 Pages
Word Count: 11399
Text:

...two characteristics. The first is whether the members act as 'market makers' - banks who always **quote** two-way prices (a '**bid**' and an 'offer' price) when asked for a quotation in the inter-bank market, indicating...

...Pfleiderer 1988]. The primary network consists of the major market-makers. These market-making banks **quote** twoway prices on the inter-bank market, take speculative positions on their own account and...

...typically be involved in both speculative trading and trading with customers, but may only occasionally **quote** two-way prices, while the tertiary network is the network of customers, who are primarily...

...vast global network of electronic dealing systems (an interactive electronic mail system where traders can **ask** for prices from a particular bank and accept or reject the offer) and phone lines...spreads that are consequently available at different times of the day (as the spread between **bid** and offer prices typically widens when the market is less liquid). These differences in market...

...While trading profits may be fair compensation for the valuable role traders play in processing **information** and in assisting in the **price** discovery function in the **market**, deliberate speculation (the taking of positions in anticipation of **price** movements), or 'informed trading by ...price against the German mark in the European Exchange Rate Mechanism (ERM) that specifies a **band** (the 'snake') within which ERM currencies can move. This forced the British government to withdraw...

...to join in was the ability of the Swedish krone to stay within a narrow **band** of the German mark, which would indicate both the ability of the Swedish krone to...

...anecdotes about manipulation abound.(5) Traders can therefore legally trade ahead of a large customer **order**. The world's central banks monitor banks' FX trading activities to varying extents. Examiners from... exchange trading. First of all, only commercial banks designated as 'authorized foreign-exchange banks' can **quote** two-way prices and make markets in foreign-exchange in Tokyo. This leads to foreign...

...banks from setting up currency-trading operations in Tokyo, as long as they do not **quote** two-way prices in the local market, and account for transactions as part of their...exchanged and the party on the other end did not just 'hit' the trader's **bid** or offer price. This ability to communicate with the counterparty was vital to traders who...areas could provide the multinational bank with information from the currently most active markets, and **order**-execution ability around the clock, both of which could contribute to superior ability to trade...in the primary network that consider themselves market-makers in that currency are obliged to **quote** both **bid** and offer prices when they are called. The trader has to instantly decide whether the price is right given her objectives and either accept the **bid** or offer price or decline to make a deal. She also has to **quote bid** and offer prices to other banks that call her, shading the price just a little...an hour every day for lunch during which time local brokers were not allowed to **quote**, though sporadic trading with Australia, Hong Kong and Singapore continued. Since 1995, Tokyo no longer...

Dialog eLink: USPTO Full Text Retrieval Options

23/6,K/2 (Item 2 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

01044957 96-94350

****USE FORMAT 7 OR 9 FOR FULL TEXT****

The vulnerability of those grieving the death of a loved one: Implications for public policy

Spring 1995 **Length:** 15 Pages
Word Count: 13852
Text:

...by disjointed and depressing thoughts. Only when involved in goal-directed activities does it acquire **order** and positive moods. Moreover, the traumatic confusions of the grievers create barriers to the achievement...least in the short-term, because they are constant reminders of the loss. The previous **quote** indicates the "charm" nature of the blue denim shirt and her inability to face the...that involve the destroying, giving away, or putting aside of the deceased's property in **order** to avoid association with the deceased and reestablish life without the loved one. Yet, some...beat the crap out of him. The executor called me and offered Barry's class **ring** and a couple of his favorite paintings.

I do not know where his ashes are...for his firm's representatives is to contact the survivors as quickly as possible and **ask** to talk with them. The purpose of the interaction is to reassure the survivors about... charged distance varied from 1.3 miles to 2.5 miles. Joy would call and **ask** for "transport only," which implied that no emergency conditions existed, and two police cars and...

...he decided to consolidate the home care service to one provider and took bids; one **bid** was $1,600 per week (over $80,000 a year) cheaper than the other. When...concern. She added, "When I get to this stage, you can bet that I will **ask** for an itemized bill."

In general, the prevailing "buyer beware" attitude of our consumer culture ...to be universally applicable. We do believe, however, that in many situations, the flow of **price information** among consumers does help to regulate the **market** and, as does Maynes, that most consumers do not actively search for such information nor...

...fruitless. Instead, we are attempting to understand the consumption processes of those in grief in **order** to suggest ways in which grief services can aid them to reach their goals in...

Dialog eLink: USPTO Full Text Retrieval Options

23/6,K/3 (Item 3 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

00960974 96-10367

****USE FORMAT 7 OR 9 FOR FULL TEXT****

Segmentation, differentiation, and flexible pricing: Experiences with information technology and segment-tailored strategies

Fall 1994 **Length:** 28 Pages
Word Count: 12842
Text:

...have the patience to allow a cold-calling sales representative to describe dozens of programs, **ask** for information on the household's domestic and international calling patterns, including traffic volume and ...of market share in the absence of flexible pricing strategies. The third section illustrates how **information** technology can be used to support **market** micro-segmentation. The fourth section describes the trade-offs consumers make between quality and **price**, introduces the concept of the generic consumption efficient frontier, and relates this to the selection...low profitability. It either loses the high-volume customers who demand low prices or must **bid** away its profits to get this business away from low-cost firms. Yet it also...All" Strategies

STOCK EXCHANGES WERE ONCE INSULATED CARTELS with entry limited by membership restrictions, and **price** competition restrained by high, fixed commissions. Time-zone differences and incomplete **information** away from the **market** also provided a geographic monopoly. Investors seeking to trade their portfolios had no alternative to...

...Exchanges succeed by providing a market mechanism, rules and regulations, and trading systems that attract **order** flow and liquidity to their markets. These in turn reduce investors' transactions costs and attract...

...virtuous circle of improved liquidity and increased trading volume [7]. The trader's adage is "**order** flow attracts **order** flow." The experience of the New York Stock Exchange in recent years illustrates that offering...
...securities. Informed traders need to execute their trades in a short time horizon (before the **information** becomes "discounted" or reflected in the **market price**). Informed traders are not readily distinguishable by their observable activities, and naturally want to conduct...

...buying and selling without revealing their information. In contrast, informationless traders buy and sell in **order** to raise cash or invest new funds, or to rebalance their portfolio. Many investors today...

...floor traders seek to earn a "jobber's turn" by buying from investors at the **bid** price and selling at the slightly higher offer price. In spite of this "**bid**-offer spread," specialists incur losses from dealing with information-based traders. They are compensated, however...

...different trading mechanism that reduces investors' commissions and spread trading costs. They have successfully attracted **order** flow away from The New York Stock Exchange (NYSE), and account for about 5 to 10 percent of the trading volume in NYSE listed shares. When a buy and sell **order** match in a crossing system, the price is the midpoint of the **bid** and offer quotes at the time. This eliminates the spread paid when a investor sells at the lower **bid quote** and buys at the slightly higher offer price. Investors using ...not execute if no counterparty orders are entered. The "fill rate," or percentage of submitted **order** volume that executes, is estimated to vary from 3 to 20 percent for the crossing...

...the profitable volume from the established exchange and increases the average costs of serving the **order** flow that remains [22]. Moreover, due to participation externalities, it also reduces the value of...

...providing immediacy to remaining traders increases, and specialists may need to widen their spreads in **order** to maintain their profitability. This makes off-exchange alternatives more attractive, and those customers whose...receive, price betterment, getting BZW to improve

on its official posted prices by raising its **bid** or lowering its
offer. Equally significant, customers differ in their investment
strategies, with potentially large...requiring less expertise, or trades
not receiving price betterment can be handled through their retail
order room (ROR). Trades requiring no expertise and no interaction
can be routed through TRADE, an...effective way of utilizing channel
capacity and of supporting communications traffic is through very high
bandwidth fiber optics. The high-capacity fiber links ...can enjoy
is superior liquidity. All traditional measures of market quality--speed
with which an **order** executes, probability that an **order**
executes, adverse impact on market price resulting directly from submitting
an **order**, size of the **bid-ask** spread--are all directly
related to **order** flow. In consequence, **order** flow attracts
further **order** flow, and this "central market defense" may be the
greatest single competitive advantage enjoyed by...

...equipped to resolve.

NOTES

1. Winner's curse is the economists' term for a winning **bid** made in
the presence of incomplete information [21]. Often, the highest bidder will
overpay given...

...Princess Kaiulani, in a private conversation, January 9, 1994.

6. In a continuous market, an **order** can be a market **order**, an
instruction to buy or sell at the best available price in the market at...a
market maker, the firm earns its profits from the spread, the difference
between its **bid** price, at which it buys securities, and its offer,
at which it sells. In addition...

23/6,K/4 (Item 1 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

13906825 **Supplier Number:** 78692821 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Progress in structural reform.(Statistical Data Included)

August , 2001
Word Count: 18456 **Line Count:** 01946

...thus contributed to the recent leap in the growth of productivity.
Strong competition in the **market** for **information**-technology
has entailed a rapid fall in the **price** of computing power, which
implies a transfer of some of the benefits generated from the...possibly
covering at present approximately 12 per cent of federal agreement covered
employees. Hence, in **order** to speed up the move towards
comprehensive enterprise agreements, the regulatory requireme nts for
collective...areas that require considerable numbers of out-of-area workers
to supplement local labour in **order** to harvest crops. Outside Job
Network, New Apprenticeships Centres have been established, which provide
"one...

...seekers. This includes further steps to enhance the transparency in the

market for vacancies in **order** to minimise the scope for hoarding information on job openings by Job Matching providers. The...

...The principle of mutual obligation is the idea that it is fair and reasonable to **ask** unemployed people to participate in an activity which helps them improve their employability and makes...19 year olds) in some form of education and training need to be improved, in **order** to smooth the transition from school to work and further education. (59) Initiatives in this...non-union agreements subject to the same compliance tests as the union agreements.

(41.) In **order** to safeguard broad public support, the WRA stipulates that any new collective or individual agreement...opportunities including full-time, part-time and casual employment.

(54.) Eardley, Saunders and Evans (2000) **quote** several surveys, including one showing substantial support for Work for the Dole among participants themselves...

...in the global allocation of resources in gas field exploration, by rejecting the take-over **bid** of a multinational energy company for Woodside, Australia's largest independent oil and gas group...

the complex and prescriptive award system. to confine awards to a	- The WRA restricts awards to 20 "allowable matters" in **order** safety net of minimum wages and core conditions of work...

reference to their JSCI score, Centrelink refers job-seekers with scores within a particular bandwidth **to** Job Network members providing Intensive Assistance. Self-help job search facilities and basic advice and ...

...which offers services on the same terms and conditions as other service providers. In order **to** maintain a contestable market for the delivery of employment services, Employment National is required to...

23/6,K/5 (Item 2 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

13894110 **Supplier Number:** 77384937 (USE FORMAT 7 OR 9 FOR FULL TEXT)
DIRECTORY OF PRODUCTS & SERVICES.(trading-related business directory)(Directory)

July 15 , 2001
Word Count: 29171 **Line Count:** 02906

Listed in alphabetical **order** by company, each listing includes the product name(s), e-mail or Web page address...

...MB RAM, modem (56k), internet access, Windows 2000
Using online real-time data, with automatic **order** execution, built-in exit rules and money management, product is designed for any market and...

...appreciation for 3,300 equities. Pro section offers stocks with trading signals based on Bollinger **bands**, plus screening for selecting

stocks based on various criteria. (NET, TAC, DQ)
Acuvest
futurcs@acuvest...

...statements, research and other periodic reports to their computers via the Internet. (NET, MM)
ATLAS **Order** Entry System
Pentium, Power Mac, 32MB RAM, modem (56k), Internet access, Windows 98
Internet-based **order** entry system with direct access to major futures markets, including Globex. Also provides real-time...Internet connection for fast fills. Free quotes, research and charts along with phone backup for **order** entry. (OB, TRAD, RTD)
Appian Graphics
info@appian.com
www.appian.com
Jeronimo 2000
(RTD...

...analyze the market. (NET, TRAD)
Advantage Futures Inc.
cbotman@mindspring.com
www.solarmatrix.com
Electronic **Order** Entry
Internet access
Supports computer-based or e-mail-based **order** entry for futures. (OB, TAG, NET)
Advantages In Options
tj@optioncaddie.com
www.optioncaddie.com brokerage allowss you to place orders, check positions, check **order**. status, get real-time quotes, check balances and check trade history. (OB, NET)
Alpha Trading...

...charts and quotes. (RTD; TAG, OPT)
LeoWeb
Pentium, Windows 95/98/NT, Internet access, Online **order** entry direct to the floor. (OB, NET)
Applied Research Co., The
jnelson@appliedresearch.com
www...

...is available for seven different data feeds. Subscription includes support, training, upgrades, customizable charts, formulas, **quote** pages, studies, news, alarms, color rules, live Excel spreadsheet links and historical data. (TAC, OPT...

...Trading/System Monitor
Pentium II, 32 MB RAM, modem (56k), Internet access, Windows 98
Online **order**-entry platform used in conjunction with eASCTrend trading system provides automatic **order** execution trades. (TRAD, NET, PORT)
B
Bansei PCF Co. Ltd.
staff@pcf.co.jp
www...

...with real-time quotes, account status, account statements, filled trades and cancel and cancel-replace **order** information. (RTD, EOD, TAC)
Billy Abrams Trading Co.
sardou@tbondtrader.com
www.tbondtrader.com

Tbondtrader...BACK)
Brewer Investment Group
info@INVESTwithBIG.com
www.INVESTwithBIG.com
GTEX Online Trading Platform
Online **order** entry platform designed for fast connection and reliability. Enhanced **order** entry features available for eSignal users. (OB, NET)
Systems Trading
Systems trading division assists investors...

...InfoTech
Pentium, 32MB RAM, modem (14.4k), CD-ROM (4x), Internet access, Windows 95
Historical **market price data** including open, high, low and closing prices on more than 700 cash, futures, index and...
ccstrade.com
CCS Quotes & Charts
Interactive intraday and historical technical analysis charts to 1959. Custom **quote** screens for both futures and options. Option center features intraday quotes and dollar premiums. (RTD...

...to 1959, options center, commodity timing dates and intraday/interday research and analysis. (GB)
Option **Quote** Center
A customized programmable intraday option **quote** page that includes **bid**/asks. Service calculates premium dollar amount for intraday. (OPT)
Silver Bullet Trades
Designed to provide...versions. (Multi-screen video adapter)
Columbia Asset Management
1201@usafutures.com
www.usafutures.com
Internet **Order** Express
Internet access
Secured, online **order** system with real-time quotes. Designed to be clear, clean and fast. (OB)
Managed Futures...com
www.commodity.com
Direct Online Services
Full service and discount brokerage services with online **order** entry through institutional strength system. (NET, TAC, PORT, OB)
Commodity Review & Outlook
review@commodityreview.com...

...CVS Futures feed
Pentium, Power Mac, 64 MB RAM, Internet access, Windows 95
Real-time **quote** feed supporting all U.S. futures exchanges. Includes application programming interface for custom development as...
98/NT, Solaris, Web browser, 50 MB hard drive space, 128 MB RAM
Internet-based **order** routing system that provides trading capabilities for several global asset types, including listed derivatives, foreign...

...OB, TRAD)
Dallas Commodity Co. Inc.
information@dallascommodity.com
www.dallascommodity.com
RCGWeb
Internet-based **order** entry system designed to provide **order** entry from any location including account access and real-time

equity. (OB, PORT, MM)
Dalrich...

...Front office fixed income trading/sales/pricing system. Trade entry, positions, profit/loss, risk and **order** management. Fixed income products, including futures and options, are supported. (TRAD)
Del Financial Services
dloesch timing **bands** and stochastics that identify high probability trading periods. (TAC)
DiMaggio & Rosario LLC
cli@drcpa.com...

...Education)
e-Discount Futures
www.netdf.com
Online futures brokerage firm designed for high-speed **order** entry at discount prices. E-mail fills delivered to your screen. No volume quotas/hidden...Pentium 11,32MB RAM, Windows 95/98/NT, CD-ROM, Internet access
Software offers charts, **quote** pages, technical analysis tools, trading account management, options analysis, news, alerts, programming language and trading...

...guaranteed IB specializing in futures, options and forex. Offers electronic trading as well as traditional **order** desk services. Specialized guidance available. (OB, TRAD)
Equis International Inc. (MetaStock)
sales@equis.com
www...

...64 MB RAM, Internet access, modem (28.8), Internet Explorer 5.0
Real-time market **quote** service designed for serious traders. Provides Internet-delivered real-time, continuously updating market quotes, charts...28.8k), Internet et access
Web-based access allows user point-and-click convenience for **order** entry, account status, working and filled orders. Backed up by fully staffed locations. (OB, BACK...

...modem (56k), Internet access
Offers access to customer accounts (real-time) as well as online **order** entry, delayed quotes and portfolio management tools. (OB, NET, DQ)
Field Online
ffgtml@erols.com...NET)
First American Division of Man Financial
chuck@mail.fadc.com
www.fadc.com
Online **order** entry
Pentium, Windows 95, modem (28.8k)
Browser-based **order** entry system with delayed quotes through Web site as well as daily statement retrieval. (OB...

...computerized trader. Software includes live quotes, trading systems and live comments from trading floors. Constant **bid**/**ask** and last trades from Chicago Mercantile Exchange. (OB, PORT)
FTS Electronic Marketplace Inc.
info@ftsmarket...Futures Discount Group
info@futuresdiscountgroup.com
www.futuresdiscountgroup.com
Discount Brokerage Services
Online and telephone **order** placement. Full-service Web site. (OB, DQ, TAC)

Futures Express
trade@efutures.com
www.efutures...and market commentary. One package to offer Wyckoff-type point-and-figure charts
(TAC)
Glen **Ring** Enterprises LLC
gring@forbin.com
www.glenring.com
View on Futures Newsletter & Daily Update
Services include Glen **Ring**'s futures market analysis and tracking on 30 popular markets. (TAC, Trading newsletter)
Global Equity...

...service. (NET, TRAD).
Great Lakes Trading Co. Inc.
pjs@gltc.com
www.gltc.com
Online **Order** Entry System
Internet direct to pits or electronic platforms **order** entry system with no minimum account size. (OB)
GreenStreet Discount Corp.
info@alaron.com
www...Degner@us.hsbc.com
www.hsbc.com
Electronic Trading System
Firm's electronic **order** entry and routing system provides straight-through processing to online customer statements. This electronic trading...

...I-NET Direct
trading@abgdirect.com
www.2futures.com
I-N-D
Browser-based online **order** entry. (OB, NET)
IASG Inc.
sales@iasg.com
www.iasg.com
Pentium, Internet access
Offers...

...Enter orders from your own PC through one of the fastest and most efficient online **order** entry systems on the Internet. Designed to let you control an entire stock portfolio with...MM)
L
Lafayette Commodities Inc.
lafayette@lafayettecommodities.com
www.lafayettecommodities.com
Market Center Direct
Online **order** entry, charts, delayed quotes, news, snapshot quotes, intraday equity update. (OB, TAC, NET)
Lakefront Futures...Thursday from 8:00 p.m. to 10:00 p.m. CST. (TAC, OB)
Lycos **Quote**.com
info@**quote**.com
www.**quote**.com
QCharts Investor
Real-time streaming historical quotes and charts broadcast via the Internet with...

...30 and 60 minutes, daily, weekly, quarterly and monthly. Charting program includes technical indicators, news, **quote** boards, etc.
(NET, TAC, RTD)

M
M. Gordon Publishing Group Inc.
info@mgordonpub.com
www can trade futures from wherever they have Internet access. eDirect **Order** Routing to all major U.S. exchanges. Displays available margin. "Speed Submit" option lets users bypass **order** confirmation window for faster **order** entry. (OS, RTD, TAC)
ManFutures.com
Pentium, Power Mac, 64 MB RAM, modem (28.8k...

...Market Analytics
erik@markeranalytics.net
www.marketanalytics.net
Cycle Forecaster
TradeStation2000i add-in. Forecasts composite **market** cycles seven to 10 bars into the future. Plots to the right of **price data**, forecasting both turning points and direction. User function provided. (TRAD, TAC, SYST)
Exhaustion Bars
TradeStation...speculators. (OB, RTD, PORT, MM)
Meridian Futures Ltd.
meridian@dccnet.com
www.meridianfutures.com
Internet **Order** Express Millennium (IOXM)
A browser-based or stand-alone Internet **order** entry system, IOXM routes your orders directly to the floor of the commodity exchanges for...

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info@meyersanalytics.com
www.meyersanalytics.com
Advanced Short Term Systems & Indicators
Nth **order** fixed memory polynomial systems for trading futures markets. (TRAD, SYST)
End-Point Fast Fourier Transform...mcmtrader.com
MCM Market Center Direct
Pentium, 64 MB RAM, modem (28.8k)
Online direct **order** entry system featuring technical charting and news. (OB, DQ, TAC)
MSF Inc.
traders@imaxx.net...

...high profits day-trading S&P 500, Nasdaq and Dow simultaneously featuring an advanced limit **order** system increasing profit potential in adverse markets. (TRAD)
National Trading Group Inc.
info@winningedgesystem.com...

...1/95/98/NT, modem, Internet access
Online futures brokerage firm designed for high-speed **order** entry at discount prices. E-Mini commissions: $7.99 per side, flat. All other U...

...fees. Minimum account: $5,000. (OB, NET)
NetFutures
info@netfutures.com
www.netfutures.com
Electronic **Order** Entry
Offers Web site and Internet **order** entry systems. Full backup telephone **order** support. (OB, TAC, NET, DQ)
NewTEK Industries
sales@variagate.com

http://variagate.com
Compu/CHART...Pentium III, Power Mac, modem (56k), Excel, DOS, Windows 2000, Internet access
Powered by PC **Quote**, the product offers analysis of fair value, under-priced, decay, percent to double, probabilities, historical...

...open positions. (PORT, BACK)
Orion Futures Group Inc.
info@orionfutures.com
www.orionfutures.com
Internet **Order** Express
Pentium, 32 MB RAM, Windows 98
Offers online trading of futures and options and...Inc.
info@peacocktrading.com
www.peacocktrading.com
Peacock Web site
Windows
Online futures and options **order** entry, quotes, charts and account information. (OB, TAC, NET)
Penterra
www.fcstone.com
Futures, OTC...

...dates/data, analysis, etc. (TAC, NET)
Primate Software Inc.
sales@primate.com
www.primate.com
Quote Monkey!
Windows 3.1
End-of-day and historical data download service for futures, stocks ...

...PC through what's designed to be one of the fastest and most efficient online **order** entry systems on the Internet. (NET, RTD, TAC)
ProFarmer
editors@profarmer.com
www.agweb.com...Clients can see their trades and account valuations updated throughout the day. (BACK)
Theodore Online **Order** Entry Software
Developed by Linleigh Software, this **order** entry system allows clients to place futures and options orders over the Internet. See a ...

...Pentium II, dedicated unit, 64 MB RAM, modem (56k), Internet access, internet Explorer
Features online **order**, entry to all active futures markets, real-time profit and loss, available margin as well...Windows 3.1/95/98/NT, modem, Internet access
This end-of-day and historical **quote** services provides data on mutual funds, equities, indexes and futures. Flexible pricing packages available from...

...access stock trading platform delivers Level II quotes, point-and-click executions, a pre-set **order**-entry window, monitoring functions, the ability to select **order**-routing preferences or auto-cycle between them. Traders can build and save customized screens. Webbased online **order**-entry also available. (RTD, DQ, EOD, HQ, PORT, OPT, OB, NET)
Robbins Trading Company
info...

...32 MB RAM, Windows 95/98/NT, modem (28.8bps), Internet access
Internet-based electronic **order** entry with sophisticated

messaging and management functionality. Selects between multiple **order**-routing alternatives. Exchange minimum margins. (OB, RTD, TAC)

System Assist

Computerized trade-management platform can...

...Championship

Real-time trading competition offering cash awards and discount commissions. Clients can use Internet **order** entry through Robbins Online or trade direct-to-the-floor. (OB, RTD, TAC)

Rockefeller Treasury...

...bank desks, hedge funds, corporate hedgers and individual speculators. (TAC, TRAD)

Rolfe & Nolan

RANorder

Automated **order**-processing system that enables futures and options brokerage firms to provide online trading services. Integrates with back office processing systems, allowing firms to provide private-labeled internet **order** entry and management, client access to real-time account status information, **quote** information and pre-trade credit evaluation and intraday risk monitoring. (OB, BACK, Brokerage software)

Rosenthal...

...LLC

info@rcgdirect.com

www.rosenthalcollingsgroup.com

RCGDirect

This large FCM offers RCGDirect, an online **order** entry and routing mechanism through a large network of introducing brokers, as well as several...package. Includes 40 indicators. (TAC)

Smart Futures

trade@smartfutures.net

www.smartfutures.net

GTEX Online **Order** Entry

Pentium, 64 MB RAM, modem (56k), Internet access, Windows 95

Connects to the Fix...

...fiorillo@sandp.com

www.spcomstock.com

Xstream Quotes

Real-time streaming **quote** applet that empowers financial Web sites to provide professional quality real-time streaming data to...

...striker.com

StrikerOnline

Headquartered in the Chicago Board of Trade building, firm provides futures electronic **order** entry system for speculators. (OB, TRAD, NET)

Stuart Financial Group Int'l.

stuartib@aol.com...RTD, TRAD, BACK)

Super Fund Financial Group Inc.

wkelly@visionlp.com

www.tradingpit.com

Internet **Order** Express

(OB, RTD, TAC)

Supertrader's Almanac, The

taucher@supertraderalmanac.com

www.supertraderalmanac.com

Online...Level II and fundamental data, plus configurable charts with extensive technical analysis. Also offers electronic **order** entry with multiple **order** routes, trading shortcuts, position monitoring and account management. (RTD, TAC, TRAD)

Trade Center Inc.
Info@tradecenterinc.com
www.tradecenterinc.com
Brokerage Services
Pentium II, Windows 98, Internet access
Offers online **order** entry, professional system monitoring, delayed quotes and charts. (OB, TRAD)
TradePlan Investments
tradepl@bellsouth.net...Power Mac, 64 MB RAM, modem (56k), internet access, Windows 98, Unix/Linux
Online futures **order** execution. Connected to online trading platform via a T3 line backbone. (OB, RTD, TAC)
TradeStation algorithms. (TRAD, TAG)
Trend Trader
mark@trendtrader.com
www.trendtrad.com
Trend Trader **Order** Routing System (TORS)
Pentium, Windows 95/98/NT, modem (33.8 bps)
Online equity and...

...and index options. Includes technical analysis and charting from trade-by-trade to monthly data. **Order** routing to SOES, EGN and DOT systems. (OB, RTD, NET)
TRENDadvisor.com
chuck@trendadvisor.com...

...www.trinitech.com
OBMS
Pentium, 32 MB RAM, Windows 95/98/NT, Internet access
An **order** book management system for futures and options traders. Provides global **order**-routing capabilities to exchanges, an internet entry point for clients and 24 hour **order** management. (NET, TRAD, **Order** Management)
Triple Point Technology Inc.
info@tpt.com
www.tpt.com
TEMPEST 2000
50 MB...

...Europe. (SYST, RTD, TRAD)
Ultra Trading Analytics Inc.
info@ultraoptions.com
www.ultraoptions.com
Option **Quote** Chains
View all options for a given underlying or filter out those that meet select...

...Holding Corp.
ufhcfcm@aol.com
www.ufhc.com
Ufutures
Internet access
Online futures and options **order** entry and resource site. (OB, TAC, NET)
Universal Technical Systems
wetradeall@aol.com
www.tradefutures...on a private, dedicated, high-speed, non-peering national network. Includes FloorPass, into-the-pit **order** entry, eSignal data feeds, squawk from the S&P pit, charting software and a dedicated...

23/6,K/6 (Item 3 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

13390805 **Supplier Number:** 62371401 (USE FORMAT 7 OR 9 FOR FULL TEXT)
SIX MYTHS OF INFORMATION AND MARKETS: INFORMATION TECHNOLOGY NETWORKS, ELECTRONIC COMMERCE, AND THE BATTLE FOR CONSUMER SURPLUS (1).

Dec , 1999
Word Count: 16265 **Line Count:** 01467

...the ASAP system at American Hospital Supply Corporation (AHSC). This interorganizational system allowed hospitals to **order** their supplies directly through personal computers or mainframes linked directly to AHSC's mainframes. Customized...growth in multimedia services, the availability of intelligent search agents, and the investments in widening **bandwidth** are just some of the trends that bode well for electronic commerce.
Conventional thinking would...

...reducing opportunistic behavior. Simple microeconomic models of perfect competition assume that buyers can costlessly acquire **information** about prices resulting in a single **market price**. While unrealistic at one time, today's electronic markets ...the supplier's marginal cost. This target marketing reverses the traditional approach where suppliers divulge **information** about themselves (specifically, **price** and product **information**) and customers comparative shop to obtain the surplus. Competition in the **market** for customized products that presumably could shift the surplus from sellers to buyers is inhibited...per feature, up from $2.00 per feature for the single-version case). Using buyer **information**, the supplier has successfully **price**-discriminated along the demand curve. While both customer types are satisfied and the **market** is expanded, surplus is moved away from consumers, rendering markets less effective.
Myth #2: Increased...IT networks so that buyers and sellers at different trading locations can access product and **price information** across markets, then the broader **market** would be more effective, benefiting the consumer. This follows because (1) the increased size of...

...and they have the incentive to do so), the markets would remain fragmented because trading **information** (e.g., **price** and quantity) in one **market**, though relevant, is unavailable to the other. Suppliers in the individual markets face reduced competition...

...Security dealers at this location collect information about the stock's value ($10) when setting **ask** (price at which the dealer sells) and **bid** (price at which the dealer buys) quotes ($10 1/2 - $9 1/2). The network...

...available IT linkages. Of course, A expects B to free ride and therefore sets wide **bid-ask** spreads in an attempt to obscure information about the security's true value (Blume and...

...security and at the same time offers inferior trading terms to customers (i.e., higher **ask** price, lower **bid** price). In response, B draws customers from A by paying brokerage firms a small commission...

...to B and promising them prices as good as th ose posted in the larger **market** so that conflict of interest issues do not arise (Easley et al. 1996). But are customers getting the best **price** given the dealer's strategy in **market** A? Clearly, hiding **information** about the true value of the security benefits dealers in both markets but customers in...Wreden 1997a). Similarly, NASDAQ is a network of computers where multiple security dealers can set **bid** and **ask** quotes on a specific stock. Each dealer's quotes are instantaneously available to all other...competition and renders markets less effective. Only after several in-depth comparative studies of the **bid-ask** spread on the NYSE vs. NASDAQ was the above problem revealed (see, e.g., Christie... Journal of MIS (8:2), 1991b, pp. 31-52.

Blume, M., and Goldstein, M. "Quotes, **Order** Flow, and Price Discovery," Journal of Finance (52:1), 1997, pp. 221-240.

Brynjolfsson, E...

...p.41.

Domowitz, I., Glen, J., and Madhavan, A. "International Cross-Listing, Ownership Rights and **Order** Flow Migration," Working Paper, Marshall School of Business, University of Southern California, 1996.

Davis, J...

...N., and O'Hara, M. "Creme-skimming or Profit-sharing? The Curious Role of Purchased **Order** Flow," Journal of Finance (51:3), 1996, pp. 811-833.

Evans, P. B., and Wurster...1997, pp. 42-45.

NASD Press Release, "Individual Investor Orders Will be Displayed in Best **Quote** on NASDAQ Under New Proposal," September 25, 1995.

Porter, M. E., and Millar, V. E...

...Market A (larger) Market B (smaller)

Stock Value	$10 (known to A)	Unknown to B
Ask and **Bid** Prices	$10 1/2 - $9 1/2	$10 1/2 - $9 1/2
Transaction Prices...		

23/6,K/7 (Item 4 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

12122609 **Supplier Number:** 59601843 (USE FORMAT 7 OR 9 FOR FULL TEXT)
TRADING meets the millennium.

Jan , 2000
Word Count: 13743 **Line Count:** 01071

...businesses. New competitors spring up. Margins shrink. Companies rise and fall. Finally, painfully, a new **order** emerges.

What that **order** will be, no one quite knows. "Nothing is set in stone," says Kenneth Pasternak, CEO...

...advent of decimal pricing of shares in U.S. markets this June will shrink the **bid**-offer on many stocks to 1 ...Wall Street group is leaning, for example, toward a linkage based on a central limit **order** book, or CLOB, essentially a mechanism where dealers must send

and display their limit orders. (It’s also called a consolidated limit **order** book.) The idea would be to create a deep pool of liquidity for brokers and...

...and trading unit at Schwab. The retail powerhouse, like many brokerages, "internalizes" much of its **order** flow and doesn’t particularly want to show it to competitors. It says CLOB proponents...negotiations" and to charge all others the same fixed commissions. One motive was to bring **order** our of the chaos of trading in city coffeehouses and at public auctions.

The pact...

...erupted in 1994, and the SEC broke up the market makers’ cartel in 1997. New **order**-handling rules gave ECNs direct access to the Nasdaq trading and quotation system and mandated...
...limit orders of between 100 and 10,000 shares that bettered a dealer’s own **quote** must be reflected in that dealer’s **quote** or forwarded to an ECN that displayed that **order**. And Regulation ATS (for alternative trading systems) permitted ECNs to register as stock exchanges. As...

...market-maker volume -- more than Merrill Lynch and Salomon Smith Barney combined. Jump-starred with **order** flow from parent Datek, Island ECN, launched in 1996, accounted for 10 percent of all...service after years of resistance. Even as on-line brokers sliced away at the retail **order** flow, which they promptly directed to ECNs, institutional clients continued to force down commissions and...

...much of their activity, internalizing customer business as much as possible and aggressively attracting additional **order** flow. "If you don’t have the **order** flow in the new trading world **order**, you will have no role. You might as well be a farmer," says Gary Kemp...

...seconds. In contrast, it takes 22 seconds for the NYSE to turn around the average **order** sent to its floor. Hull employs just 250 people.

With Hull, Goldman has a souped-up trading engine to fight for vital **order** flow. The firm expects to leverage Hull’s proprietary system by making it a magnet for options and by beginning to pay for retail equity **order** flow.

"It’s a question of whether you’re willing to cannibalize an old, successful...

...given that Nasdaq is a dealer market. Together they hammered out details of a new **quote** display system -- dubbed the Super Montage -- aimed at providing a consolidated and more complete look...Hank Paulson, Phil Purcell and myself felt that, as three of the major providers of **order** flow, we wanted a seat at the table to reflect our views."

For Levitt it...

...ensure a more level playing field, it would base the links on a central limit **order** book, with price and time priority in execution. Some form of automatic execution for matching...

...endorse any particular market, but he discussed at length the possibility of a "virtual limit **order** book" that would pull together all limit orders and quotes from all trading systems and...

...than the soundstage of the bull market. CNBC broadcasts live from the exchange floor; celebrities **ring** the opening and closing bells; listed companies put on goofy but media-magnetic stunts out...

...surveillance.

But the exchange ultimately relies on a single business line: a daily stream of **order** flow sent by upstairs member firms, which could disappear with the flick of a trader...

...persuader, still must find a compromise between a floor where some people still use paper **order** tickers and a new trading world where exchanges run on a few mail-**order** Dell computers.
But what would the exchange be? Upstairs firms want to see, at the... market participants to see much more information about participants' limit orders -- not just the best **bid-ask** spreads. On the NYSE today, that information is in the specialist's book, and on...

...the best price first? Should all orders from all dealers be displayed? Must an entire **order** be shown?
So-called "hard" CLOBs work on a first-come, first-served principle, often...

...act as its own stock exchange, matching buyer and seller, keeping both sides of the **bid-ask** spread.
Why would the largest brokerage firms in the world want to build such a...

...held by discount and on-line brokerage firms in technology stocks. Most of this retail **order** flow would be pooled and displayed in a CLOB, solving the problem for upstairs desks...
...says Gorman. "Would they like to find convenience in Schwab's and E*Trade's **order** flow? Absolutely right."
He says the major firms also would like to internalize. "Goldman buys ...

...argues, in fact, that CLOBs are anticompetitive. If firms are forced to send all their **order** flow to a CLOB with price-time priority, he says, they'll have no incentive...

...of execution or the promise of price improvement. A CLOB trading facility, processing every limit **order** in the market, would also create a new type of systemic risk during market crises...

...organizations.
Wall Street favors one SRO, independent from any of the market centers competing for **order** flow, in effect a "super SRO." Grasso argues that without its regulatory infrastructure, the Big...as a public utility, a place where investors, intermediaries and companies with disparate interests bring **order** to what otherwise would be immensely complex trading markets. Such an NYSE might look more...

...chairman Levitt is definitely open to alternatives to what he initially said about a limit **order** book," says Gorman.
And a spokesman for Levitt, who declined to be interviewed for this ...

...issue that it's impossible to catalogue all of them. As for a central limit **order** book, he says that Levitt merely raised the possibility in his speech -- he never said...

...modern electronic communications networks, including Island ECN and Bloomberg Tradebook, formed
1997 Nasdaq implement new **order**-handling rules imposed by the Securities and Exchanges Commission; trading spreads collapse
1998
July London...Eight electronic trading systems announce plans to create after-hours linkage for sharing trade and **price**

information
September 23 In a speech at Columbia University, SEC chairman Levitt urges creation of a centralized **market** and the abolition of NYSE Rule 390
European exchanges back off their plans for a...

...October 11 Nasdaq begins cooperation with OptiMark
October 12 Nasdaq proposes a voluntary central limit **order** book dubbed the Super Montage
November 2 Knight/Trimark agrees to send orders to OptiMark...are their kissing cousins. Already most major European exchanges have the type of consolidated limit **order** book that is just now being debated in the U.S. "Europe has a model...consider what those end customers are saying, versus what our intermediary customers are saying, and **ask**, "How do we reinvent ourselves?"
That reinvention is not going to be a vertical answer...

...Start with our pricing policy for electronically delivered orders. That policy used to say any **order** up to 2,099 shares at the market, executed within two seconds, was not subject...this issue and look at it not just from a regulatory standpoint, but also to **ask** us, "Where is all this going?" We had a group of investment banking firms that...

...a strong vibrant market.
What is the group looking for?
No. 1, a central limit **order** book with time and price priority. No. 2, strong links between trading venues. And No...Why shouldn't we have an efficient system of linkages create an electronic central limit **order** book with time and price priorities? Conversely, just because a venue is electronic, efficient and...

...at least a step in the direction I'm talking about, with a central limit **order** book, and price priority.
You say you don't want the markets to fragment, but...

23/6,K/8 (Item 5 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

11969265 **Supplier Number:** 59834898 (USE FORMAT 7 OR 9 FOR FULL TEXT)
E-Commerce Dot-Corn Companies Target Pulp and Paper Industry Transactions.

Feb , 2000
Word Count: 5560 **Line Count:** 00469

...Research defines e-commerce as the trade of goods and services in which the final **order** is placed over the internet.
However, while consumers shopping for shoes or clothes, or looking...

...many cases, it will change the job itself.
The paper industry has jumped on the **bandwagon**--at least in terms of using the Internet--and most paper producers and supplier companies...

...is changing how customers interact is Weyerhaeuser's Door Builder site,

which allows distributors to **order** and specify doors via the internet.

ALL PLUGGED IN? Will people in the industry use...maximum output. The whole system was set up to run, run, run the mills in **order** to spread fixed costs across maximum volumes. In turn, in this environment, the role of...

...those that connect the home.

Brand new business models have developed too, such as new **order**-to-delivery models emerging in the high-tech world, exemplified by Cisco and Dell. In...big the Internet has become, Tom Beatty, director, Industry Architects for Oracle Corporation shared a **quote** from the well-respected CEO of GE Corp., Jack Welch. Mr. Welch stated in 1999...will change a traditional company's business model and increase the collaboration among competitors in **order** to increase efficiency.

He also reviewed, in retrospect, some of the changes that have occurred...

...levels.

Exchanges offer several benefits Carroll noted. Markets are more stable due to more efficient **market information**, have less **price** volatility; and are less cyclical. This will increase paper industry P/E ratios over time...

...exchange work for this industry segment (wood products) include: it's large and fragmented; has **price** volatility; reliable **market** and **price data** are tedious to extract. He commented on the inefficiencies brought about by inventories in the...firm that helps companies develop e-commerce strategy and implementations, commented on various sites in **order** to show some of the key features that make sites useful. She noted that ChemExchange...Amazon.com. If you want to buy something you go the company's website and **order** it, because it's a brand name you want.

The third piece of the mix...

...seasonal, hard to forecast

	Overly dependent on price
Exchange	Many to many
	Economist's ideal (**bid ask** pricing mechanism, optimal matching)
	Multi-variable
	Creates value in markets where price/demand fluctuates
	Value...

23/6,K/9 (Item 6 from file: 148)

DIALOG(R)File 148: Gale Group Trade & Industry DB

10699865 **Supplier Number:** 53410848 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Implied volatility functions: empirical tests.

Dec , 1998

Word Count: 13686 **Line Count:** 01099

...but the pattern on this day is typical of those since the October 1987 stock **market** crash. The **data** for the example include all **bid** and **ask price** quotes for call options during the half-hour interval of 2:45 to 3:15...by solving for the volatility rate ((Sigma)) that equates the model price with the observed **bid** or **ask quote**.(5)

Figure 1 illustrates the typical pattern in the S&P 500 implied volatilities. Strikingly...

...implied volatilities across exercise prices shown in Figure 1 appear to be economically significant. The **bid**-implied volatility for the short-term, in-the-money call, for example, exceeds the **ask**-implied volatility for the short-term, at-the-money call,(7) implying the possibility of...Rubinstein requires that all option values computed using the implied tree fall within their respective **bid** and **ask** prices observed in the market - that is, that no arbitrage opportunities exist. More recent research, however, relaxes this requirement. Jackwerth and Rubinstein (1996), for example, advocate using **bid**/**ask** midpoint prices, as we do, rather than the **bid**/**ask** **band** due to the tendency to "(overfit) the data by following all the small wiggles" when...riskless interest rate by using the T-bill rates implied by the average of the **bid** and **ask** discounts reported in the Wall Street Journal. The ti-period interest rate is obtained by... option. To create a forward option price, we multiply the average of the option's **bid** and **ask** price quotes(14) by the interest accumulation factor appropriate to the option's expiration, (e...

...quotes are generally not supported by actual trades.

Finally, we only use those options with **bid**/**ask** price quotes during the last half hour of trading (2:45 to 3:15 p...

...theoretical values.

(ii) The mean outside error (MOE) is the average valuation error outside the **bid**/**ask** spread. If the theoretical value is below (exceeds) the option's **bid** (**ask**) price, the error is defined as the difference between the theoretical value and the **bid** (**ask**) price, and, if the theoretical value is within the spread, the error is set equal...

...categories.

(iii) The average absolute error (MAE) is the average absolute valuation error outside the **bid**/**ask** spread. This measure illustrates the exactness with which each model fits within the quoted **bid** and **ask** prices over all option categories.

(iv) The frequency (FREQ) indicates the proportion of observations where...overall sample. The MAE shows that with Model 3 an essentially exact fit, within the **bid**-**ask** spread, has been achieved because the average absolute error outside the spread is a mere... ...reported for the Black-Scholes model (Model 0) show that the theoretical value exceeds the **ask** price on average for call options, 16.6 cents, and is below the **bid** price for put options, -23.9 cents. This behavior arises from the character of our...

...and moneyness, the Black-Scholes model value appears to be too low (relative to the **bid** price) for in-the-money calls and for out-of-the-money puts. This is...

...high).

Figure 3 shows the dollar valuation errors (i.e., the model values less the **bid**/**ask** midpoints) of Model 0 for the subsample of call options with 40 to 70 days to expiration. Also shown are normalized **bid**/**ask** spreads (i.e., the **bid**/**ask** prices less

the **bid**/**ask** midpoint). Note first that the **bid**/**ask** spreads are as high as one dollar for deep in-the-money calls on the left of the figure. As we move right along the horizontal axis, the maximum **bid**/**ask** spread stays at a dollar until the moneyness variable is about -2.5 percent, and...

...spread behavior is consistent with the CBOE's maximum spread rules described earlier. The average **bid**/**ask** spread across all option series used in our estimation is approximately 47 cents.

Figure 4...

...The DVF model improves the cross-sectional fit. Where the valuation errors are outside the **bid**/**ask** spread, they appear randomly, with (TABULAR DATA FOR TABLE I OMITTED) a slight tendency for...0.182

(a.sub.3)	-0.114	-0.232
(a.sub.4)		0.093

In **order** to examine explicitly the issue of coefficient stability, Figure 5 has four panels containing plots...moneyness, we see that the Black-Scholes model value is too low (relative to the **bid** price) for in-the-money calls and out-of-the-money puts and is too high (relative to the **ask** price) for out-of-the-money calls and in-the-money puts. This pattern is...the solution of a stochastic differential equation (so-called "slow-growth" and "Lipschitz" conditions).

In **order** to allay these two fears simultaneously, we perform a simple experiment. In place of estimating...

...to true parameter instability, may be responsible for the poor fit one week later. In **order** to address this possibility, we now redo the entire analysis, using the cross sections of...sneer even when volatility is constant over time.

7 The variation in the difference between **bid** and **ask** volatilities depends on two factors. First, although **bid**/**ask** spreads are competitively determined, they tend to vary systematically with option moneyness. In part, this...

...governing the maximum spreads for options with different premia. The rules state that the maximum **bid**/**ask** spread is (a) 1/4 for options whose **bid** price is less than $2, (b) 3/8 for **bid** prices between $2 and $5, (c) 1/2 for **bid** prices between $5 and $10, (d) 3/4 for **bid** prices between $10 and $20, and (e) 1 for **bid** prices above $20. See the Chicago Board Options Exchange (1995, pp. 2123-2124). Second, the...

...the-money having much lower sensitivities. As a result, for a given spread between the **bid** and **ask** price quotes, the range of Black/Scholes implied volatilities will be lowest for at-the...

...maturity constraints on price imposed, and estimate a separate volatility function for each.

14 Using **bid**/**ask** midpoints rather than trade prices reduces noise in the cross-sectional estimation of the volatility...

23/6,K/10 (Item 7 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

07810550 **Supplier Number:** 17002596 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Why do NASDAQ market makers avoid odd-eighth quotes?

Dec , 1994
Word Count: 9493 **Line Count:** 00744

Abstract: The NASDAQ multiple dealer market is designed to produce narrow **bid**- **ask** spreads through the competition for **order** flow among individual dealers. However, we find that odd-eighth quotes are virtually nonexistent for...
Abstract:

Unlike previous studies that compute summary measures of **bid-ask** spreads, we examine the entire distribution of dollar spreads using an extensive sample of inside **bid** and inside **ask** quotes for 100 of the most active NASDAQ stocks in 1991. We find that spreads...

...The lack of one-eighth spreads can be traced to an absence of either inside **bid** or inside **ask** quotes ending in odd-eighths (1/8, 3/8, 5/8, and 7/8) for...

...result reflects an implicit agreement among market makers to avoid using odd-eighths in quoting **bid** and **ask** prices and that a large number of market makers per stock is not necessarily synonymous...

...for firms listed on NASDAQ documented in previous research. For example, Goldstein (1993) examines closing **bid-ask** spreads for both NYSE and NASDAQ stocks during 1990. He first adjusts NASDAQ spreads to...

...0.18 wider than similar NYSE-listed stocks.

Christie and Huang (1994) use all intraday **quote** changes and trades for the 60 days surrounding exchange listing to study a sample of...

...liquidity premium, measured as the difference between trade prices and the midpoint of the prevailing **bid** and **ask** quotes, declines by about $0.05 per share when stocks are listed on either exchange.(1)

Affleck-Graves, Hegde, and Miller (1994) present evidence that **order**-processing costs, the component of the spread that is unrelated to information asymmetry or dealer...

...reducing the need for direct dealer intervention. Similarly, Vijh (1990) compares the market depth and **bid-ask** spreads for NYSE stocks and Chicago Board Options Exchange (CBOE) options, which trade in a multiple-dealer market, and finds that, although the CBOE offers greater depth, the relative **bid-ask** spreads are appreciably wider than for NYSE stocks. He further shows that the wider spreads...

...orderly market." Although specialists have an exclusive franchise in their stocks, they face competition for **order** flow from floor traders on the exchange, from other exchanges, and from public limit orders. Limit **order** prices are part of the spread displayed to the market and take precedence over specialists...

...1995) find that market makers rarely post quotes that place them at both the inside **bid** and inside **ask**.

The fundamental premise of the NASDAQ system is that competition for **order** flow among dealers will produce narrow spreads. In contrast to the organized exchanges, NASDAQ limit...
...compete with each other, and have been reluctant to accept additional competition from the public **order** flow. The NASD depends on this interdealer competition to keep markets fair, orderly and liquid...
summarizes our findings.

I. Data and Sampling Procedures

The data consist of all trades and **quote** revisions in 1991 for 100 large, actively traded NASDAQ stocks and 100 NYSE/AMEX stocks...

...result of intentionally including the 50 largest NASDAQ stocks in the sample.

All trade and **quote data** are obtained from the Institute for the Study of Securities Markets (ISSM). Trade **data** contain both the transaction **price** and the number of shares, while **quote data** include all intraday inside **quote** revisions. Quotes that originate from the NASDAQ **market** reflect the inside **bid** and inside **ask** computed from the best individual dealer quotes, while NYSE/AMEX quotes are updated electronically by the specialist and can reflect either their own quotes or those of the limit **order** book. A series of filters are then applied to the intraday trades and quotes. Since ISSM assigns a negative value to suspicious trade prices, volumes and **bid-ask** quotes prior to releasing the data, we exclude all negative trades and quotes. In addition, we eliminate all locked or crossed-quotes (where the **bid** either equalled or exceeded the **ask**) since they are not sustainable. We also discard all quotes that originate in markets other...

...listed on the NYSE or AMEX emerge from their respective exchanges. An additional filter eliminates **quote** revisions that reflect a change in the depth (i.e., the number of shares for which the **quote** is valid) without affecting the inside **bid** or inside **ask**. We impose this condition since the depth variable for NASDAQ stocks does not provide a...

...all dealers. Thus, all quotes studied in this paper reflect a revision in the inside **bid** and/or inside **ask**.

Table I

The Distribution of Average Daily Closing Prices and End-of-Year Market Capitalizations...

...condition codes other than a regular sale, and exclude all quotes that are not best **bid** and offer (BBO)-Eligible.(6) Finally, ...two listed stocks. In contrast to the NASDAQ sample, between 5 and 40 percent of **quote** revisions result in a one-eighth spread for most listed stocks.

To provide specific examples...

...lie on each eighth, where the percentage is an average of the frequencies at the **bid** and the **ask**. The results are plotted in Figure 3. The figure indicates that the use of odd...

...calculated for each firm, where the percentage is an average of the frequencies at the **bid** and the **ask**. Figure 4 provides a histogram showing the number of NASDAQ stocks that share a similar...

...illustrate, Panel B of Table II reports the distribution of odd-eighth quotes at the **bid** and at the **ask** for Apple Computer, Lotus Development, and MCI Communications. Fewer than 2 percent of all **bid** or **ask** quotes fall on odd eighths for both Apple and Lotus, while more than half of the **bid** or **ask** quotes are on odd eighths for MCI.(9)

The concentration of odd-eighth **quote** frequencies near 0 and 50 percent suggests that the intermediate percentages between 10 and 40...

...examine this issue, we calculate the average time that odd-eighth quotes (at either the **bid** or **ask**) and even-eighth quotes (at both the **bid** and **ask**) are in effect. The analysis separately

considers the 70 (30) NASDAQ stocks whose market makers...

...odd eighth.
The results are presented in Figure 6. The horizontal axis denotes the mean **quote** duration (in minutes) for each stock. The height of the bar depicts the number of stocks sharing each average **quote** duration. Panel A, which presents the results for the 70 issues whose market makers rarely...

...eighths, indicates that for most stocks the average length of time that an odd-eighth **quote** is effective is less than 2 minutes. In contrast, the mean duration of even-eighth...

...using all potential price fractions. In a competitive market with multiple market makers competing for **order** flow, the almost complete absence of odd-eighth quotes is an enigma. The rest of...

...1,000 shares or less are seldom negotiated but are executed automatically through the Small **Order** Execution System (SOES). These orders are allocated sequentially among dealers posting inside quotes or preferenced...across firms may be explained by the underlying economic factors that are thought to determine **bid-ask** spreads.
Spreads may be inversely related to volume if greater volume implies that dealers can...

...and the standard deviation of daily returns estimated from the midpoint of the daily closing **bid** and **ask** prices.(12) We also include dummy variables to indicate whether trades were executed on a...any specific dealer who has agreed in advance to execute trades at the best quoted **bid** or **ask** price, independent of their posted quotes.
Alternatively, if a violator has agreed to accept preferenced...

...wrong side of the spread. That is, if the offending dealer has the best quoted **ask**, sell orders can be directed to that dealer, who is required to execute them at the inside **bid**. Although the size of the preferenced orders will be 1,000 shares or less per...

...using an odd eighth to better a spread should result in an instant increase in **order** flow through SOES to the firm posting the improved **quote**. Thus, it is difficult to understand why, in the absence of tacit collusion, at least...to a dealer market that translate into higher costs of market making. Since the total **order** flow is fragmented across market makers, each dealer observes the **order** flow directed to that dealer alone. Thus, dealers face increased risks of being "picked off...

...supply liquidity by posting quotes inside the existing spread are unable to capture the increased **order** flow from the price improvement. This inability to capture trades exists since other dealers can match their **quote** or preference orders to dealers who will match the new price.
Thus, little incentive exists...

...dealer. In addition, the lack of time precedence cannot explain why dealers collectively elected to **quote** stocks without using odd eighths.
It is important to note that these results do not...

...1994) presents evidence that suggests the adoption of a one-sixteenth tick size would reduce **bid-ask** spreads by an average of 38 percent for NYSE stocks, although the depth at these...

...spreads.

IV. Summary and Conclusions

While previous studies rely on comparisons of summary measures of **bid-ask** spreads across markets, we examine the entire distribution of dollar spreads for 100 NASDAQ stocks...

...different markets are quoted. The volume of data is extensive and includes all trades and **quote** updates for the entire year of 1991. We find that, unlike NYSE/AMEX stocks, the...

...spreads for NASDAQ stocks are directly linked to a pervasive and anomalous distaste for posting **bid** or **ask** quotes on odd eighths. We find that when odd-eighth quotes do appear among firms...

...of dealers. Our logistic regressions indicate that variables previously shown to affect the width of **bid-ask** spreads have little power in identifying the firms whose market makers avoid or utilize odd dealer market where the inside spread represents the best consolidated **quote** from as many as 60 market makers. One possible explanation for our results is that we are observing the **quote**-setting behavior that emerges when individual market makers implicitly agree to maintain spreads of at...

...unable to envision any scenario in which 40 to 60 dealers who are competing for **order** flow would simultaneously and consistently avoid using odd-eighth quotes without an implicit agreement to post quotes only on the even **price** fractions. However, our **data** do not provide direct evidence of tacit collusion among NASDAQ **market** makers. Such inferences would require direct observation of market-maker intervention forcing the withdrawal of...

...the dealer and specialist markets may also translate into intraday differences in the width of **bid-ask** spreads. For example, McInish and Wood (1992), Brock and Kleidon (1992) and Kleidon and Werner (1993) show that **bid-ask** spreads of listed stocks narrow steadily until early afternoon and then widen at the close. Similarly, Chan, Fong, and Stulz (1994) find that **bid-ask** spreads of NYSE stocks follow a U-shaped pattern over the day. However, they also...

...U-shaped pattern over the day. In contrast, Chan, Christie, and Schultz (1995) show that **bid-ask** spreads of NASDAQ stocks decline throughout the day and are narrowest at the close of...In addition, market makers can elect to execute their retail customers' orders using the inside **bid** or **ask** prices. In this case, the orders are never entered into the NASDAQ execution systems, and...

...the trade.

15 A related explanation for wider NASDAQ spreads concerns the activity of "SOES **Bandits**." Since the SOES permits automatic execution of trades for 1,000 shares or less, these...

...Thus, individual dealers need to maintain wider spreads to compensate for losses to the "SOES **Bandits**." See Stoll (1992) and the December 21, 1993 edition of the Wall Street Journal for...

...Graves, J., S. Hegde, and R. Miller, 1994, Trading mechanisms and the components of the **bid-ask** spread, Journal of Finance 49, 1471-1488.

Benston, G., and R. Hagerman, 1974, Determinants of **bid-ask** spreads in the over-the-counter market, Journal of Financial Economics 1, 353-364.

Brock...

...K. C., W. Christie, and P. Schultz, 1995, Market structure and the intraday pattern of **bid-ask** spreads for NASDAQ securities, Journal of Business, Forthcoming.
Chan, K. C., W. Fong, and R...

...MIT Press, Cambridge, Mass.).
Goldstein, M., 1993, Specialist vs. dealer markets: A comparison of displayed **bid-ask** spreads on NASDAQ and the NYSE, Working paper, University of Pennsylvania.
Harris, L., 1990, Liquidity...

...clustering and discreeteness, Review of Financial Studies 4, 389-415.
-----, 1994, Minimum price variations, discrete **bid-ask** spreads, and quotation sizes, Review of Financial Studies 7, 149-178.
-----, and J. Hasbrouck, 1992, Market vs. Limit orders: The SuperDot evidence on **order** submission strategy, Working paper, New York University and the University of Southern California.
Kleidon, A...

...paper, Stanford University.
McInish, T., and R. Wood, 1992, An analysis of intraday patterns in **bid/ask** spreads for NYSE stocks, Journal of Finance 47, 753-764.
Neal, R., 1992, A comparison...

? s (band or bands or ring or rings) and s18

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
           2262  S18
          36339  BAND
          27771  BANDS
          27817  RING
          14117  RINGS
             73  (BAND OR BANDS OR RING OR RINGS) AND S18

 15: ABI/Inform(R)_1971-2010/Jul 03
          10429  S18
          66523  BAND
          19956  BANDS
          57271  RING
          22467  RINGS
            565  (BAND OR BANDS OR RING OR RINGS) AND S18

160: Gale Group PROMT(R)_1972-1989
           1372  S18
           6002  RING
           1394  BANDS
           6130  BAND
           2391  RINGS
              6  (BAND OR BANDS OR RING OR RINGS) AND S18

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
          22057  S18
          47387  BANDS
         116218  RING
         156886  BAND
          48441  RINGS
            829  (BAND OR BANDS OR RING OR RINGS) AND S18
```

```
275: Gale Group Computer DB(TM)_1983-2010/May 25
            1620  S18
            7186  BANDS
           25682  BAND
           32462  RING
            6866  RINGS
             119  (BAND OR BANDS OR RING OR RINGS) AND S18

610: Business Wire_1999-2010/Jul 04
            4370  S18
            8890  BANDS
           11893  RING
           26054  BAND
            5328  RINGS
              70  (BAND OR BANDS OR RING OR RINGS) AND S18

810: Business Wire_1986-1999/Feb 28
             899  S18
            1942  BANDS
            9344  BAND
            8820  RING
            1682  RINGS
              24  (BAND OR BANDS OR RING OR RINGS) AND S18

TOTAL: FILES 9,15,160 and ...
          326958  BAND
          114526  BANDS
          260483  RING
          101292  RINGS
           43009  S18
     S24    1686  (BAND OR BANDS OR RING OR RINGS) AND S18
```

? s s24 and s20

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
              73  S24
             169  S20
              73  S24 AND S20

 15: ABI/Inform(R)_1971-2010/Jul 03
             565  S24
             958  S20
             565  S24 AND S20

160: Gale Group PROMT(R)_1972-1989
               6  S24
              11  S20
               6  S24 AND S20

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
             829  S24
            1526  S20
             829  S24 AND S20

275: Gale Group Computer DB(TM)_1983-2010/May 25
             119  S24
             239  S20
             119  S24 AND S20
```

```
610: Business Wire_1999-2010/Jul 04
              70  S24
             191  S20
              70  S24 AND S20

810: Business Wire_1986-1999/Feb 28
              24  S24
              58  S20
              24  S24 AND S20

TOTAL: FILES 9,15,160 and ...
            1686  S24
            3152  S20
     S25    1686  S24 AND S20
```

? **ds**

```
Set   File    Items   Description
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S1                0   AU=ALMEIDA,C?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S2                0   AU=LUSSIER, A?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S3                0   AU=LOGUE,J?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S4                0   AU=FALONI,D?
        9   1785600
       15   3128136
      160         0
      148  10389423
      275   1052988
      610   1501764
      810         0
S5         17857911   PD>20030129
```

```
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S6                  0   (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATI-
                    ON)) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMEN-
                    SION))
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S7                  0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION-
                    )) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSI-
                    ON))
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S8                  0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION
                    OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (-
                    25N) (SIZE OR DIMENSION))
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S9                  0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                    ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                    S) (25N) (SIZE OR DIMENSION))
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S10                 0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                    ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RIN-
                    GS OR BANDS)) (25N) (SIZE OR DIMENSION))
         9          0
        15          0
       160          0
       148          0
       275          0
       610          0
       810          0
S11                 0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                    ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                    S) (25N) (SIZE OR DIMENSION))
         9          0
        15          0
```

```
      160         0
      148         0
      275         0
      610         0
      810         0
S12               0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                     ION OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS)
                      AND (SIZE OR DIMENSION))
        9        15
       15       428
      160         0
      148       184
      275        21
      610         4
      810         0
S13             652   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                     ION OR DATA))
        9        84
       15       363
      160        39
      148       546
      275       111
      610        25
      810         9
S14            1177   (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)
        9       129
       15      3883
      160         0
      148       849
      275       108
      610        23
      810         3
S15            4995   (QUOTE AND ORDER) AND (BID AND ASK)
        9         0
       15         2
      160         0
      148         0
      275         0
      610         0
      810         0
S16               2   S14 AND S15
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S17               0   S16 NOT S5
        9      2262
       15     10429
      160      1372
      148     22057
      275      1620
      610      4370
      810       899
S18           43009   MARKET (10N) PRICE (10N) (DATA OR INFORMATION)
        9       129
       15      3883
      160         0
      148       849
      275       108
```

```
      610        23
      810         3
S19            4995   QUOTE AND ORDER AND BID AND ASK
        9       169
       15       958
      160        11
      148      1526
      275       239
      610       191
      810        58
S20            3152   (BAND? OR RING?) AND S18
        9         4
       15        22
      160         0
      148        28
      275         8
      610         0
      810         0
S21              62   S19 AND S20
        9         0
       15         3
      160         0
      148        13
      275         7
      610         0
      810         0
S22              23   S21 NOT S5
        9         0
       15         3
      160         0
      148        13
      275         6
      610         0
      810         0
S23              22   RD  (unique items)
        9        73
       15       565
      160         6
      148       829
      275       119
      610        70
      810        24
S24            1686   (BAND OR BANDS OR RING OR RINGS) AND S18
        9        73
       15       565
      160         6
      148       829
      275       119
      610        70
      810        24
S25            1686   S24 AND S20
```

? s s24 and s18

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
            73  S24
          2262  S18
            73  S24 AND S18
```

```
 15: ABI/Inform(R)_1971-2010/Jul 03
            565  S24
          10429  S18
            565  S24 AND S18

160: Gale Group PROMT(R)_1972-1989
              6  S24
           1372  S18
              6  S24 AND S18

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
            829  S24
          22057  S18
            829  S24 AND S18

275: Gale Group Computer DB(TM)_1983-2010/May 25
            119  S24
           1620  S18
            119  S24 AND S18

610: Business Wire_1999-2010/Jul 04
             70  S24
           4370  S18
             70  S24 AND S18

810: Business Wire_1986-1999/Feb 28
             24  S24
            899  S18
             24  S24 AND S18

TOTAL: FILES 9,15,160 and ...
           1686  S24
          43009  S18
     S26   1686  S24 AND S18
```

? s s19 and s24

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
             73  S24
            129  S19
              1  S19 AND S24

 15: ABI/Inform(R)_1971-2010/Jul 03
            565  S24
           3883  S19
              7  S19 AND S24

160: Gale Group PROMT(R)_1972-1989
              0  S19
              6  S24
              0  S19 AND S24

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
            829  S24
            849  S19
             21  S19 AND S24

275: Gale Group Computer DB(TM)_1983-2010/May 25
            119  S24
```

```
            108  S19
              7  S19 AND S24

610: Business Wire_1999-2010/Jul 04
             23  S19
             70  S24
              0  S19 AND S24

810: Business Wire_1986-1999/Feb 28
              3  S19
             24  S24
              0  S19 AND S24

TOTAL: FILES 9,15,160 and ...
           4995  S19
           1686  S24
     S27     36  S19 AND S24
```

? s s27 not s5

```
  9: Business & Industry(R)_Jul/1994-2010/Jul 02
              1  S27
        1785600  S5
              0  S27 NOT S5

 15: ABI/Inform(R)_1971-2010/Jul 03
              7  S27
        3128136  S5
              2  S27 NOT S5

160: Gale Group PROMT(R)_1972-1989
              0  S27
              0  S5
              0  S27 NOT S5

148: Gale Group Trade & Industry DB_1976-2010/Jul 02
             21  S27
       10389423  S5
              8  S27 NOT S5

275: Gale Group Computer DB(TM)_1983-2010/May 25
              7  S27
        1052988  S5
              7  S27 NOT S5

610: Business Wire_1999-2010/Jul 04
              0  S27
        1501764  S5
              0  S27 NOT S5

810: Business Wire_1986-1999/Feb 28
              0  S27
              0  S5
              0  S27 NOT S5

TOTAL: FILES 9,15,160 and ...
             36  S27
       17857911  S5
     S28     17  S27 NOT S5
```

? **rd**

```
S29      16  RD  (unique items)
```

? **t /6,k/1-10**

Dialog eLink: USPTO Full Text Retrieval Options

29/6,K/1 (Item 1 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

01165285 98-14680

****USE FORMAT 7 OR 9 FOR FULL TEXT****

Circadian rhythms: The effects of global market integration in the currency trading industry

Fourth Quarter 1995 **Length:** 30 Pages
Word Count: 11399
Text:

...two characteristics. The first is whether the members act as 'market makers' - banks who always **quote** two-way prices (a '**bid**' and an 'offer' price) when asked for a quotation in the inter-bank market, indicating...

...Pfleiderer 1988]. The primary network consists of the major market-makers. These market-making banks **quote** twoway prices on the inter-bank market, take speculative positions on their own account and...

...typically be involved in both speculative trading and trading with customers, but may only occasionally **quote** two-way prices, while the tertiary network is the network of customers, who are primarily...

...vast global network of electronic dealing systems (an interactive electronic mail system where traders can **ask** for prices from a particular bank and accept or reject the offer) and phone lines...spreads that are consequently available at different times of the day (as the spread between **bid** and offer prices typically widens when the market is less liquid). These differences in market...

...While trading profits may be fair compensation for the valuable role traders play in processing **information** and in assisting in the **price** discovery function in the **market**, deliberate speculation (the taking of positions in anticipation of **price** movements), or 'informed trading by ...price against the German mark in the European Exchange Rate Mechanism (ERM) that specifies a **band** (the 'snake') within which ERM currencies can move. This forced the British government to withdraw...

...to join in was the ability of the Swedish krone to stay within a narrow **band** of the German mark, which would indicate both the ability of

the Swedish krone to...

...anecdotes about manipulation abound.(5) Traders can therefore legally trade ahead of a large customer **order**. The world's central banks monitor banks' FX trading activities to varying extents. Examiners from... exchange trading. First of all, only commercial banks designated as 'authorized foreign-exchange banks' can **quote** two-way prices and make markets in foreign-exchange in Tokyo. This leads to foreign...

...banks from setting up currency-trading operations in Tokyo, as long as they do not **quote** two-way prices in the local market, and account for transactions as part of their...exchanged and the party on the other end did not just 'hit' the trader's **bid** or offer price. This ability to communicate with the counterparty was vital to traders who...areas could provide the multinational bank with information from the currently most active markets, and **order**-execution ability around the clock, both of which could contribute to superior ability to trade...in the primary network that consider themselves market-makers in that currency are obliged to **quote** both **bid** and offer prices when they are called. The trader has to instantly decide whether the price is right given her objectives and either accept the **bid** or offer price or decline to make a deal. She also has to **quote** **bid** and offer prices to other banks that call her, shading the price just a little...an hour every day for lunch during which time local brokers were not allowed to **quote**, though sporadic trading with Australia, Hong Kong and Singapore continued. Since 1995, Tokyo no longer...

Dialog eLink: USPTO Full Text Retrieval Options

29/6,K/2 (Item 2 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

01044957 96-94350

****USE FORMAT 7 OR 9 FOR FULL TEXT****

The vulnerability of those grieving the death of a loved one: Implications for public policy

Spring 1995 **Length:** 15 Pages
Word Count: 13852
Text:

...by disjointed and depressing thoughts. Only when involved in goal-directed activities does it acquire **order** and positive moods. Moreover, the traumatic confusions of the grievers create barriers to the achievement...least in the short-term, because they are constant reminders of the loss. The previous **quote** indicates the "charm" nature of the blue denim shirt and her inability to face the...that involve the destroying, giving away, or putting aside of the deceased's property in **order** to avoid association with the deceased and reestablish life without the loved one. Yet, some...beat the crap out of him. The executor called me and offered Barry's class **ring** and a couple of his favorite paintings.

I do not know where his ashes are...for his firm's representatives is to contact the survivors as quickly as possible and **ask** to talk with them. The purpose of the interaction is to reassure the survivors about... charged distance varied from 1.3 miles to 2.5 miles. Joy would call and **ask** for "transport only," which implied that no emergency conditions existed, and two police cars and...

...he decided to consolidate the home care service to one provider and took bids; one **bid** was $1,600 per week (over $80,000 a year) cheaper than the other. When...concern. She added, "When I get to this stage, you can bet that I will **ask** for an itemized bill."

In general, the prevailing "buyer beware" attitude of our consumer culture ...to be universally applicable. We do believe, however, that in many situations, the flow of **price information** among consumers does help to regulate the **market** and, as does Maynes, that most consumers do not actively search for such information nor...

...fruitless. Instead, we are attempting to understand the consumption processes of those in grief in **order** to suggest ways in which grief services can aid them to reach their goals in...

29/6,K/3 (Item 1 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

13894110 **Supplier Number:** 77384937 (USE FORMAT 7 OR 9 FOR FULL TEXT)
DIRECTORY OF PRODUCTS & SERVICES.(trading-related business directory)(Directory)

July 15 , 2001
Word Count: 29171 **Line Count:** 02906

Listed in alphabetical **order** by company, each listing includes the product name(s), e-mail or Web page address...

...MB RAM, modem (56k), internet access, Windows 2000
Using online real-time data, with automatic **order** execution, built-in exit rules and money management, product is designed for any market and...

...appreciation for 3,300 equities. Pro section offers stocks with trading signals based on Bollinger **bands**, plus screening for selecting stocks based on various criteria. (NET, TAC, DQ)
Acuvest
futurcs@acuvest...

...statements, research and other periodic reports to their computers via the Internet. (NET, MM)
ATLAS **Order** Entry System
Pentium, Power Mac, 32MB RAM, modem (56k), Internet access, Windows 98
Internet-based **order** entry system with direct access to major futures markets, including Globex. Also provides real-time...Internet connection for fast fills. Free quotes, research and charts along with

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Appian Graphics
info@appian.com
www.appian.com
Jeronimo 2000
(RTD...

...analyze the market. (NET, TRAD)
Advantage Futures Inc.
cbotman@mindspring.com
www.solarmatrix.com
Electronic **Order** Entry
Internet access
Supports computer-based or e-mail-based **order** entry for futures. (OB, TAG, NET)
Advantages In Options
tj@optioncaddie.com
www.optioncaddie.com brokerage allowss you to place orders, check positions, check **order**. status, get real-time quotes, check balances and check trade history. (OB, NET)
Alpha Trading...

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LeoWeb
Pentium, Windows 95/98/NT, Internet access, Online **order** entry direct to the floor. (OB, NET)
Applied Research Co., The
jnelson@appliedresearch.com
www...

...is available for seven different data feeds. Subscription includes support, training, upgrades, customizable charts, formulas, **quote** pages, studies, news, alarms, color rules, live Excel spreadsheet links and historical data. (TAC, OPT...

...Trading/System Monitor
Pentium II, 32 MB RAM, modem (56k), Internet access, Windows 98
Online **order**-entry platform used in conjunction with eASCTrend trading system provides automatic **order** execution trades. (TRAD, NET, PORT)
B
Bansei PCF Co. Ltd.
staff@pcf.co.jp
www...

...with real-time quotes, account status, account statements, filled trades and cancel and cancel-replace **order** information. (RTD, EOD, TAC)
Billy Abrams Trading Co.
sardou@tbondtrader.com
www.tbondtrader.com
Tbondtrader...BACK)
Brewer Investment Group
info@INVESTwithBIG.com
www.INVESTwithBIG.com
GTEX Online Trading Platform
Online **order** entry platform designed for fast connection and reliability. Enhanced **order** entry features available for eSignal users. (OB, NET)
Systems Trading
Systems trading division assists investors...

...InfoTech

Pentium, 32MB RAM, modem (14.4k), CD-ROM (4x), Internet access, Windows 95
Historical **market price data** including open, high, low and closing prices on more than 700 cash, futures, index and...
ccstrade.com
CCS Quotes & Charts
Interactive intraday and historical technical analysis charts to 1959. Custom **quote** screens for both futures and options. Option center features intraday quotes and dollar premiums. (RTD...

...to 1959, options center, commodity timing dates and intraday/interday research and analysis. (GB)
Option **Quote** Center
A customized programmable intraday option **quote** page that includes **bid**/asks. Service calculates premium dollar amount for intraday. (OPT)
Silver Bullet Trades
Designed to provide...versions. (Multi-screen video adapter)
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www.usafutures.com
Internet **Order** Express
Internet access
Secured, online **order** system with real-time quotes. Designed to be clear, clean and fast. (OB)
Managed Futures...com
www.commodity.com
Direct Online Services
Full service and discount brokerage services with online **order** entry through institutional strength system. (NET, TAC, PORT, OB)
Commodity Review & Outlook
review@commodityreview.com...

...CVS Futures feed
Pentium, Power Mac, 64 MB RAM, Internet access, Windows 95
Real-time **quote** feed supporting all U.S. futures exchanges. Includes application programming interface for custom development as...
98/NT, Solaris, Web browser, 50 MB hard drive space, 128 MB RAM
Internet-based **order** routing system that provides trading capabilities for several global asset types, including listed derivatives, foreign...

...OB, TRAD)
Dallas Commodity Co. Inc.
information@dallascommodity.com
www.dallascommodity.com
RCGWeb
Internet-based **order** entry system designed to provide **order** entry from any location including account access and real-time equity. (OB, PORT, MM)
Dalrich...

...Front office fixed income trading/sales/pricing system. Trade entry, positions, profit/loss, risk and **order** management. Fixed income products, including futures and options, are supported. (TRAD)
Del Financial Services
dloesch timing **bands** and stochastics that identify high probability trading periods. (TAC)
DiMaggio & Rosario LLC
cli@drcpa.com...

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e-Discount Futures
www.netdf.com
Online futures brokerage firm designed for high-speed **order** entry at discount prices. E-mail fills delivered to your screen. No volume quotas/hidden...Pentium 11,32MB RAM, Windows 95/98/NT, CD-ROM, Internet access
Software offers charts, **quote** pages, technical analysis tools, trading account management, options analysis, news, alerts, programming language and trading...

...guaranteed IB specializing in futures, options and forex. Offers electronic trading as well as traditional **order** desk services. Specialized guidance available. (OB, TRAD)
Equis International Inc. (MetaStock)
sales@equis.com
www...

...64 MB RAM, Internet access, modem (28.8), Internet Explorer 5.0
Real-time market **quote** service designed for serious traders. Provides Internet-delivered real-time, continuously updating market quotes, charts...28.8k), Internet et access
Web-based access allows user point-and-click convenience for **order** entry, account status, working and filled orders. Backed up by fully staffed locations. (OB, BACK...

...modem (56k), Internet access
Offers access to customer accounts (real-time) as well as online **order** entry, delayed quotes and portfolio management tools. (OB, NET, DQ)
Field Online
ffgtml@erols.com...NET)
First American Division of Man Financial
chuck@mail.fadc.com
www.fadc.com
Online **order** entry
Pentium, Windows 95, modem (28.8k)
Browser-based **order** entry system with delayed quotes through Web site as well as daily statement retrieval. (OB...

...computerized trader. Software includes live quotes, trading systems and live comments from trading floors. Constant **bid**/**ask** and last trades from Chicago Mercantile Exchange. (OB, PORT)
FTS Electronic Marketplace Inc.
info@ftsmarket...Futures Discount Group
info@futuresdiscountgroup.com
www.futuresdiscountgroup.com
Discount Brokerage Services
Online and telephone **order** placement. Full-service Web site. (OB, DQ, TAC)
Futures Express
trade@efutures.com
www.efutures...and market commentary. One package to offer Wyckoff-type point-and-figure charts
(TAC)
Glen **Ring** Enterprises LLC
gring@forbin.com
www.glenring.com
View on Futures Newsletter & Daily Update
Services include Glen **Ring**’s futures market analysis and tracking on 30 popular markets. (TAC, Trading newsletter)
Global Equity...

...service. (NET, TRAD).
Great Lakes Trading Co. Inc.
pjs@gltc.com
www.gltc.com
Online **Order** Entry System
Internet direct to pits or electronic platforms **order** entry system with no minimum account size. (OB)
GreenStreet Discount Corp.
info@alaron.com
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Firm's electronic **order** entry and routing system provides straight-through processing to online customer statements. This electronic trading...

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www.lafayettecommodities.com
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info@**quote**.com
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...30 and 60 minutes, daily, weekly, quarterly and monthly. Charting program includes technical indicators, news, **quote** boards, etc. (NET, TAC, RTD)
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www can trade futures from wherever they have Internet access. eDirect **Order** Routing to all major U.S. exchanges. Displays available margin. "Speed Submit" option lets users bypass **order** confirmation window for faster **order** entry. (OS, RTD, TAC)
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End-of-day and historical data download service for futures, stocks ...

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www.agweb.com...Clients can see their trades and account valuations updated throughout the day. (BACK)
Theodore Online **Order** Entry Software
Developed by Linleigh Software, this **order** entry system allows clients to place futures and options orders over the Internet. See a ...

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Features online **order**, entry to all active futures markets, real-time profit and loss, available margin as well...Windows 3.1/95/98/NT, modem, Internet access
This end-of-day and historical **quote** services provides data on mutual funds, equities, indexes and futures. Flexible pricing packages available from...

...access stock trading platform delivers Level II quotes, point-and-click executions, a pre-set **order**-entry window, monitoring functions, the ability to select **order**-routing preferences or auto-cycle between them. Traders can build and save customized screens. Webbased online **order**-entry also available. (RTD, DQ, EOD, HQ, PORT, OPT, OB, NET)
Robbins Trading Company
info...

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Internet-based electronic **order** entry with sophisticated messaging and management functionality. Selects between multiple **order**-routing alternatives. Exchange minimum margins. (OB, RTD, TAC)
System Assist
Computerized trade-management platform can...

...Championship
Real-time trading competition offering cash awards and discount commissions. Clients can use Internet **order** entry through Robbins Online or trade direct-to-the-floor. (OB, RTD, TAC)
Rockefeller Treasury...

...bank desks, hedge funds, corporate hedgers and individual speculators.

(TAC, TRAD)
Rolfe & Nolan
RANorder
Automated **order**-processing system that enables futures and options brokerage firms to provide online trading services. Integrates with back office processing systems, allowing firms to provide private-labeled internet **order** entry and management, client access to real-time account status information, **quote** information and pre-trade credit evaluation and intraday risk monitoring. (OB, BACK, Brokerage software)
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RCGDirect
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trade@smartfutures.net
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Xstream Quotes
Real-time streaming **quote** applet that empowers financial Web sites to provide professional quality real-time streaming data to...

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StrikerOnline
Headquartered in the Chicago Board of Trade building, firm provides futures electronic **order** entry system for speculators. (OB, TRAD, NET)
Stuart Financial Group Int'l.
stuartib@aol.com...RTD, TRAD, BACK)
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Internet **Order** Express
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www.supertraderalmanac.com
Online...Level II and fundamental data, plus configurable charts with extensive technical analysis. Also offers electronic **order** entry with multiple **order** routes, trading shortcuts, position monitoring and account management. (RTD, TAC, TRAD)
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Pentium II, Windows 98, Internet access
Offers online **order** entry, professional system monitoring, delayed quotes and charts. (OB, TRAD)
TradePlan Investments
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Online futures **order** execution. Connected to online trading platform via a T3 line backbone. (OB, RTD, TAC)

TradeStation algorithms. (TRAD, TAG)
Trend Trader
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www.trendtrad.com
Trend Trader **Order** Routing System (TORS)
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...and index options. Includes technical analysis and charting from trade-by-trade to monthly data. **Order** routing to SOES, EGN and DOT systems. (OB, RTD, NET)
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...www.trinitech.com
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www.tpt.com
TEMPEST 2000
50 MB...

...Europe. (SYST, RTD, TRAD)
Ultra Trading Analytics Inc.
info@ultraoptions.com
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Option **Quote** Chains
View all options for a given underlying or filter out those that meet select...

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www.tradefutures...on a private, dedicated, high-speed, non-peering national network. Includes FloorPass, into-the-pit **order** entry, eSignal data feeds, squawk from the S&P pit, charting software and a dedicated...

29/6,K/4 (Item 2 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

12122609 **Supplier Number:** 59601843 (USE FORMAT 7 OR 9 FOR FULL TEXT)
TRADING meets the millennium.

Jan , 2000
Word Count: 13743 **Line Count:** 01071

...businesses. New competitors spring up. Margins shrink. Companies rise and fall. Finally, painfully, a new **order** emerges.
What that **order** will be, no one quite knows. "Nothing is set in stone," says Kenneth Pasternak, CEO...

...advent of decimal pricing of shares in U.S. markets this June will shrink the **bid**-offer on many stocks to 1 ...Wall Street group is leaning, for example, toward a linkage based on a central limit **order** book, or CLOB, essentially a mechanism where dealers must send and display their limit orders. (It's also called a consolidated limit **order** book.) The idea would be to create a deep pool of liquidity for brokers and...

...and trading unit at Schwab. The retail powerhouse, like many brokerages, "internalizes" much of its **order** flow and doesn't particularly want to show it to competitors. It says CLOB proponents...negotiations" and to charge all others the same fixed commissions. One motive was to bring **order** our of the chaos of trading in city coffeehouses and at public auctions.
The pact...

...erupted in 1994, and the SEC broke up the market makers' cartel in 1997. New **order**-handling rules gave ECNs direct access to the Nasdaq trading and quotation system and mandated...
...limit orders of between 100 and 10,000 shares that bettered a dealer's own **quote** must be reflected in that dealer's **quote** or forwarded to an ECN that displayed that **order**. And Regulation ATS (for alternative trading systems) permitted ECNs to register as stock exchanges. As...

...market-maker volume -- more than Merrill Lynch and Salomon Smith Barney combined. Jump-starred with **order** flow from parent Datek, Island ECN, launched in 1996, accounted for 10 percent of all...service after years of resistance. Even as on-line brokers sliced away at the retail **order** flow, which they promptly directed to ECNs, institutional clients continued to force down commissions and...

...much of their activity, internalizing customer business as much as possible and aggressively attracting additional **order** flow. "If you don't have the **order** flow in the new trading world **order**, you will have no role. You might as well be a farmer," says Gary Kemp...

...seconds. In contrast, it takes 22 seconds for the NYSE to turn around the average **order** sent to its floor. Hull employs just 250 people.
With Hull, Goldman has a souped-up trading engine to fight for vital **order** flow. The firm expects to leverage Hull's proprietary system by making it a magnet for options and by beginning to pay for retail equity **order** flow.
"It's a question of whether you're willing to cannibalize an old, successful...

...given that Nasdaq is a dealer market. Together they hammered out details of a new **quote** display system -- dubbed the Super Montage -- aimed at providing a consolidated and more complete look...Hank Paulson, Phil Purcell and myself felt that, as three of the major providers of **order** flow, we wanted a seat at the table to reflect our views."
For Levitt it...

...ensure a more level playing field, it would base the links on a central

limit **order** book, with price and time priority in execution. Some form of automatic execution for matching...

...endorse any particular market, but he discussed at length the possibility of a "virtual limit **order** book" that would pull together all limit orders and quotes from all trading systems and...

...than the soundstage of the bull market. CNBC broadcasts live from the exchange floor; celebrities **ring** the opening and closing bells; listed companies put on goofy but media-magnetic stunts out...

...surveillance.

But the exchange ultimately relies on a single business line: a daily stream of **order** flow sent by upstairs member firms, which could disappear with the flick of a trader...

...persuader, still must find a compromise between a floor where some people still use paper **order** tickers and a new trading world where exchanges run on a few mail-**order** Dell computers.

But what would the exchange be? Upstairs firms want to see, at the... market participants to see much more information about participants' limit orders -- not just the best **bid-ask** spreads. On the NYSE today, that information is in the specialist's book, and on...

...the best price first? Should all orders from all dealers be displayed? Must an entire **order** be shown?

So-called "hard" CLOBs work on a first-come, first-served principle, often...

...act as its own stock exchange, matching buyer and seller, keeping both sides of the **bid-ask** spread.

Why would the largest brokerage firms in the world want to build such a...

...held by discount and on-line brokerage firms in technology stocks. Most of this retail **order** flow would be pooled and displayed in a CLOB, solving the problem for upstairs desks...
...says Gorman. "Would they like to find convenience in Schwab's and E*Trade's **order** flow? Absolutely right."

He says the major firms also would like to internalize. "Goldman buys ...

...argues, in fact, that CLOBs are anticompetitive. If firms are forced to send all their **order** flow to a CLOB with price-time priority, he says, they'll have no incentive...

...of execution or the promise of price improvement. A CLOB trading facility, processing every limit **order** in the market, would also create a new type of systemic risk during market crises...

...organizations.

Wall Street favors one SRO, independent from any of the market centers competing for **order** flow, in effect a "super SRO." Grasso argues that without its regulatory infrastructure, the Big...as a public utility, a place where investors, intermediaries and companies with disparate interests bring **order** to what otherwise would be immensely complex trading markets. Such an NYSE might look more...

...chairman Levitt is definitely open to alternatives to what he initially said about a limit **order** book," says Gorman.

And a spokesman for Levitt, who declined to be interviewed for this ...

...issue that it's impossible to catalogue all of them. As for a central limit **order** book, he says that Levitt merely raised the possibility in his speech -- he never said...

...modern electronic communications networks, including Island ECN and Bloomberg Tradebook, formed

1997 Nasdaq implement new **order**-handling rules imposed by the Securities and Exchanges Commission; trading spreads collapse

1998

July London...Eight electronic trading systems announce plans to create after-hours linkage for sharing trade and **price information**

September 23 In a speech at Columbia University, SEC chairman Levitt urges creation of a centralized **market** and the abolition of NYSE Rule 390

European exchanges back off their plans for a...

...October 11 Nasdaq begins cooperation with OptiMark

October 12 Nasdaq proposes a voluntary central limit **order** book dubbed the Super Montage

November 2 Knight/Trimark agrees to send orders to OptiMark...are their kissing cousins. Already most major European exchanges have the type of consolidated limit **order** book that is just now being debated in the U.S. "Europe has a model...consider what those end customers are saying, versus what our intermediary customers are saying, and **ask**, "How do we reinvent ourselves?"

That reinvention is not going to be a vertical answer...

...Start with our pricing policy for electronically delivered orders. That policy used to say any **order** up to 2,099 shares at the market, executed within two seconds, was not subject...this issue and look at it not just from a regulatory standpoint, but also to **ask** us, "Where is all this going?" We had a group of investment banking firms that...

...a strong vibrant market.

What is the group looking for?

No. 1, a central limit **order** book with time and price priority. No. 2, strong links between trading venues. And No...Why shouldn't we have an efficient system of linkages create an electronic central limit **order** book with time and price priorities? Conversely, just because a venue is electronic, efficient and...

...at least a step in the direction I'm talking about, with a central limit **order** book, and price priority.

You say you don't want the markets to fragment, but...

29/6,K/5 (Item 3 from file: 148)

DIALOG(R)File 148: Gale Group Trade & Industry DB

10699865 **Supplier Number:** 53410848 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Implied volatility functions: empirical tests.

Dec , 1998

Word Count: 13686 **Line Count:** 01099

...but the pattern on this day is typical of those since the October 1987 stock **market** crash. The **data** for the example include all **bid** and **ask price** quotes for call options during the half-hour interval of 2:45 to 3:15...by solving for the volatility rate ((Sigma)) that equates the model price with the observed **bid** or **ask quote**.(5)

Figure 1 illustrates the typical pattern in the S&P 500 implied volatilities. Strikingly...

...implied volatilities across exercise prices shown in Figure 1 appear to be economically significant. The **bid**-implied volatility for the short-term, in-the-money call, for example, exceeds the **ask**-implied volatility for the short-term, at-the-money call,(7) implying the possibility of...Rubinstein requires that all option values computed using the implied tree fall within their respective **bid** and **ask** prices observed in the market - that is, that no arbitrage opportunities exist. More recent research, however, relaxes this requirement. Jackwerth and Rubinstein (1996), for example, advocate using **bid**/**ask** midpoint prices, as we do, rather than the **bid**/**ask** **band** due to the tendency to "(overfit) the data by following all the small wiggles" when...riskless interest rate by using the T-bill rates implied by the average of the **bid** and **ask** discounts reported in the Wall Street Journal. The ti-period interest rate is obtained by... option. To create a forward option price, we multiply the average of the option's **bid** and **ask** price quotes(14) by the interest accumulation factor appropriate to the option's expiration, (e...

...quotes are generally not supported by actual trades.

Finally, we only use those options with **bid**/**ask** price quotes during the last half hour of trading (2:45 to 3:15 p...

...theoretical values.

(ii) The mean outside error (MOE) is the average valuation error outside the **bid**/**ask** spread. If the theoretical value is below (exceeds) the option's **bid** (**ask**) price, the error is defined as the difference between the theoretical value and the **bid** (**ask**) price, and, if the theoretical value is within the spread, the error is set equal...

...categories.

(iii) The average absolute error (MAE) is the average absolute valuation error outside the **bid**/**ask** spread. This measure illustrates the exactness with which each model fits within the quoted **bid** and **ask** prices over all option categories.

(iv) The frequency (FREQ) indicates the proportion of observations where...overall sample. The MAE shows that with Model 3 an essentially exact fit, within the **bid**-**ask** spread, has been achieved because the average absolute error outside the spread is a mere... ...reported for the Black-Scholes model (Model 0) show that the theoretical value exceeds the **ask** price on average for call options, 16.6 cents, and is below the **bid** price for put options, -23.9 cents. This behavior arises from the character of our...

...and moneyness, the Black-Scholes model value appears to be too low (relative to the **bid** price) for in-the-money calls and for out-of-the-money puts. This is...

...high).

Figure 3 shows the dollar valuation errors (i.e., the model values less the **bid**/**ask** midpoints) of Model 0 for the subsample of call options with 40 to 70 days to expiration. Also shown are normalized **bid**/**ask** spreads (i.e., the **bid**/**ask** prices less

the **bid**/**ask** midpoint). Note first that the **bid**/ **ask** spreads are as high as one dollar for deep in-the-money calls on the left of the figure. As we move right along the horizontal axis, the maximum **bid**/**ask** spread stays at a dollar until the moneyness variable is about -2.5 percent, and...

...spread behavior is consistent with the CBOE's maximum spread rules described earlier. The average **bid**/**ask** spread across all option series used in our estimation is approximately 47 cents.

Figure 4...

...The DVF model improves the cross-sectional fit. Where the valuation errors are outside the **bid**/**ask** spread, they appear randomly, with (TABULAR DATA FOR TABLE I OMITTED) a slight tendency for...0.182

(a.sub.3)	-0.114	-0.232
(a.sub.4)		0.093

In **order** to examine explicitly the issue of coefficient stability, Figure 5 has four panels containing plots...moneyness, we see that the Black-Scholes model value is too low (relative to the **bid** price) for in-the-money calls and out-of-the-money puts and is too high (relative to the **ask** price) for out-of-the-money calls and in-the-money puts. This pattern is...the solution of a stochastic differential equation (so-called "slow-growth" and "Lipschitz" conditions).

In **order** to allay these two fears simultaneously, we perform a simple experiment. In place of estimating...

...to true parameter instability, may be responsible for the poor fit one week later. In **order** to address this possibility, we now redo the entire analysis, using the cross sections of...sneer even when volatility is constant over time.

7 The variation in the difference between **bid** and **ask** volatilities depends on two factors. First, although **bid**/**ask** spreads are competitively determined, they tend to vary systematically with option moneyness. In part, this...

...governing the maximum spreads for options with different premia. The rules state that the maximum **bid**/**ask** spread is (a) 1/4 for options whose **bid** price is less than $2, (b) 3/8 for **bid** prices between $2 and $5, (c) 1/2 for **bid** prices between $5 and $10, (d) 3/4 for **bid** prices between $10 and $20, and (e) 1 for **bid** prices above $20. See the Chicago Board Options Exchange (1995, pp. 2123-2124). Second, the...

...the-money having much lower sensitivities. As a result, for a given spread between the **bid** and **ask** price quotes, the range of Black/Scholes implied volatilities will be lowest for at-the...

...maturity constraints on price imposed, and estimate a separate volatility function for each.

14 Using **bid**/**ask** midpoints rather than trade prices reduces noise in the cross-sectional estimation of the volatility...

29/6,K/6 (Item 4 from file: 148)

DIALOG(R)File 148: Gale Group Trade & Industry DB

07304742 **Supplier Number:** 16124482 (USE FORMAT 7 OR 9 FOR FULL TEXT)

Mean reversion of Standard & Poor's 500 index basis changes: arbitrage-induced or statistical illusion? (includes appendices)

June , 1994
Word Count: 10913 **Line Count:** 00885

...RAES (of the CBOE). To that extent, the dealers or the system face a stale-**quote**, pick-off problem similar to that at the NYSE. The much discussed, heavy use of...

...index basis changes has been amply documented. MacKinlay and Ramaswamy (1988) find significant negative first-**order** auto-correlation in normalized intraday basis changes of the S&P 500 index futures traded ...

...basis changes exists even when the level of the basis is well within the pricing **bands** imposed by index arbitrage transaction costs. We also show that significant, negative autocorrelation exists in...

...futures price changes gives a "corrected" basis change series, in which, as predicted, the first-**order** autocorrelation is greatly reduced. Section V summarizes the article and offers some suggestions for reconciling...maturity, implying, among other things, that basis changes up to maturity will have negative first-**order** serial dependence.(2) Any contaminating effects of forced basis convergence can be controlled, however, by...

...from the unpredictable random walk suggested by the underlying model. In particular, high, negative first-**order** autocorrelation in basis changes has been reported for every international stock index/index futures complex...

...basis during the period June 1983 through June 1987. They find that the average first-**order** autocorrelation for fifteen-minute changes in the mispricing variable (equation (4)) is -0.23 during the overall sample period; and that the first-**order** autocorrelations of individual contracts are higher later in the sample period than earlier despite the...

...find similar basis behavior. On a contract-by-contract basis they report an average first-**order** autocorrelation in the mispricing variable of -0.24 using closing prices. Like MacKinlay and Ramaswamy, Yadav and Pope find that the first-**order** negative autocorrelation becomes larger in recent years when stock market trading activity is higher. Finally...

...the June 1988, September 1988, June 1989, and September 1989 contract months. Again, the first-**order** autocorrelation is negative on average and is largest for the most recent contract.

II. Arbitrage-induced Behavior?

As common as documentation of negative first-**order** autocorrelation in observed stock index basis changes is the attribution of the behavior to the...fifteen-minute price changes in the S&P 500 index level show significant positive first-**order** autocorrelation. Over the entire sample period, the autocorrelation of index level changes is 0.128...

...differential, lagged adjustment of prices of portfolio stocks to new market information induces positive first-**order** autocorrelation in observed index level changes.9

The positive autocorrelation in the fifteen-minute S...

...changes in the index futures contract show little autocorrelation. For the overall period, the first-**order** autocorrelation is not only small, but is slightly negative, -0.029, reflecting almost surely the very narrow **bid-ask** spread in the S&P 500 futures

market. The variance attributable to new **information** completely swamps the serial covariance attributable to the **bid-ask price** effect.

Third, the contemporaneous correlation between observed price changes in the index and index futures...

...sixty minutes. The longer the time interval, the less important are the infrequent trading and **bid-ask** price effects relative to the price change attributable to new information. Increased trading activity in ...in the index level.(10)

Finally, and most important, Table I shows persistent negative first-**order** autocorrelation in the basis changes of the S&P 500 index. For the fifteen-minute...

...reduced the mean reversion in the observed basis.(11)

C. Basis Changes Within Transaction Cost **Bands**

To see whether and to what extent the observed negative autocorrelation in basis changes can...

...the index level at the end of the first interval. Mispricings outside these transaction cost **bands** are taken as potential arbitrage opportunities. Subsequent price changes are thus more likely to be arbitrage induced than when the mispricings are within the transaction cost **bands**. Note also that the transaction cost filter we apply is conservative. The transaction costs incurred...

...index level changes are highly positively autocorrelated. Most important, the basis changes show high first-**order** negative autocorrelation--behavior that cannot be attributed to index arbitrage.

E. Index Arbitrage Trading Volume

Taken together, then, the Value Line and transaction cost **band** tests imply that formal arbitrage cannot explain the negative autocorrelation in basis TABULAR DATA OMITTED...true price process may arise, for example, from the random bouncing of transaction prices between **bid** and **ask** levels. Roll (1984) shows that **bid-ask** price bounce induces negative first-**order** autocorrelation in observed price changes even though price innovations are serially independent. In the context of this paper, the **bid-ask** price bounce will show up more strongly in the futures. Because the index level is...

...at a given point in time, the trading by some stocks traded most recently at **bid** prices is offset by other stocks trading most recently at **ask** levels.(14) The futures contract, on the other hand, is a single security. Negative first-**order** autocorrelation in observed price changes is likely for extremely short intervals where the price movement attributable to new information may be small relative to the size of the **bid-ask** spread.

Besides **bid-ask** bounce, individual security return series may be influenced by the splitting of large buy and...

...autocorrelated. This means that the primary microstructure effects are infrequent trading of index stocks and **bid-ask** bounce for futures. We now try to capture their effects in simple, parsimonious time series...

...have traded for many periods, though the likelihood of that event declines geometrically with the **order** of the lag.

The process governing observed futures price changes is modeled differently. Because the...

...prices, on the other hand, may appear to bounce as successive

transactions are executed at **bid** and **ask** price levels. Roll (1984) shows that the **bid-ask** bounce induces negative serial covariance in the observed price changes series. This bounce can be...

...price innovation, [Mathematical Expression Omitted] is the observed index level change, and [Theta] is the **bid-ask** bounce parameter. The innovation [f.sub.t] is assumed to be a mean zero, serially uncorrelated shock variable with a homoskedastic variance, [Mathematical Expression Omitted]. The **bid-ask** bounce parameter is negative and has the range -1 [is less than] [Theta] [is less than] 0. Holding other factors constant, the larger the **bid-ask** spread, the greater the absolute value of [Theta].

C. Observed Price Change Variances

The models...

...components--the variance of true price changes and the variance of the price movements from **bid** to **ask** levels--the variance of the observed futures price changes index is greater than the variance of the true futures price changes as long as the **bid-ask** spread in the futures market is economically significant (i.e., [Theta] [is less than] 0). The larger is the **bid-ask** spread, the greater is [Mathematical Expression Omitted]. The estimated first-**order** autocorrelation of futures price changes reported earlier in Table I, however, shows that the effect of the **bid-ask** spread is trivial. The autocorrelation using fifteen-minute price changes (where the **bid-ask** price effect should be greatest) is -0.029 over the entire sample period. In other...

...the index are, in fact, equal (i.e., [Mathematical Expression Omitted]).

PROPOSITION 1: If the **bid-ask** spread in the futures market is economically significant ([Theta] [is less than] 0), if the...

...infrequent trading of stocks within the index portfolio is a more serious concern than the **bid-ask** price effect in the futures.

D. Dynamics of Observed Basis Changes

We turn now to...

...also the increase in mean reversion that has been experienced in recent years.

The first-**order** autocorrelation coefficient of [Mathematical Expression Omitted] is defined below:

PROPOSITION 2: The first-**order** autocorrelation of observed basis changes in terms of the true underlying parameters is

[Mathematical Expression Omitted].

Proof of Proposition 2: See Appendix B.

If the **bid-ask** spread in the futures market is economically insignificant ([Theta] = 0) and if the stocks within...

...index portfolio trade continuously ([Phi] = 0), the numerator in equation (9) and hence the first-**order** autocorrelation of observed basis changes are zero. First-**order** autocorrelation vanishes only where the microstructure effects of **bid-ask** spreads and infrequent trading are absent.

Equation (9) shows that the first-**order** autocorrelation of observed basis changes is a function of the five parameters [Phi], [Theta], [[Sigma...autocorrelation in the observed futures price changes, we assume [Theta] = 0.

PROPOSITION 3: If the **bid-ask** spread in the futures market is economically insignificant ([Theta] = 0), if the stocks within the...

...variance ([Mathematical Expression Omitted]) and are perfectly

positively correlated ([[Rho].sub.fs] = +1), the first-**order** autocorrelation of observed basis changes is

[Mathematical Expression Omitted].

Proof of Proposition 3: See Appendix B.

Proposition 3 implies that the first-**order** autocorrelation in observed basis changes is always negative over the admissible range of values for...

...generality in our results, therefore, we write equation (10) as follows:

PROPOSITION 4: If the **bid-ask** spread in the futures market is economically insignificant ([Theta] = 0) and if the stocks within the index portfolio trade infrequently ([Phi] [is greater than] 0), the first-**order** autocorrelation of observed basis changes is

[Mathematical Expression Omitted],

where the subscripts of the contemporaneous...

...the standard deviation of index level innovations is set equal to 1.1. The first-**order** autocorrelation in the observed basis changes is shown for values of the autoregressive parameter, [Phi...

...Phi], is set equal to 0.1.

Figures 2 and 3 show that the first-**order** autocorrelation of observed basis changes depends critically on the configuration of the parameters [Rho], [Phi...

...is realistic.

An important implication of Figures 2 and 3 is that strong negative first-**order** autocorrelation in observed basis changes may be observed even when stocks in the index portfolio...

...with values of the standard deviation ratio R in excess of one, strong negative first-**order** autocorrelation arises. Because infrequent trading of the stocks in the index portfolio is well documented...

...is much less than] [Phi] [is less than] 1), negative and significant values of first-**order** autocorrelation in the observed basis changes [Mathematical Expression Omitted] are to be expected. The predicted...

...E. Observed Autocorrelation in Terms of Observed Parameters

Propositions 2 and 4 express the first-**order** autocorrelation of observed basis changes in terms of the true (unobserved) parameters [[Sigma].sub.f...analogue to Proposition 2 in terms of the observable parameters is:

PROPOSITION 5: The first-**order** autocorrelation of observed basis changes in terms of the observed parameters is

[Mathematical Expression Omitted...

...The analogue to Proposition 4 for the observed parameters is then:

PROPOSITION 6: If the **bid-ask** spread in the futures market is economically insignificant ([Theta] = 0) and if the stocks within the index portfolio trade infrequently ([Phi] [is greater than] 0), then the first-**order** autocorrelation of observed basis changes in terms of the observed parameters is

[Mathematical Expression Omitted...

...the autoregressive parameter [Phi] equal to 0.1 and plot in Figure 4 the first-**order** autocorrelation of the observed basis changes for observed parameter values of [[Rho].sup.0] between...
...are consistent with the empirical results in Table I. The figure implies that negative, first-**order** autocorrelation in the S&P 500 basis changes is, indeed, the expected behavior.

IV. Empirical...

...III, we presented our theory of observed basis change predictability and showed that negative first-**order** autocorrelation in observed basis changes is expected for a wide range of plausible parameter configurations ...

...are right, this purging of the infrequent trading effects should substantially reduce the negative first-**order** autocorrelation in observed basis changes. The results of these tests are in Table V. For...

...than for observed index changes. For the overall sample period, the index innovations have first-**order** autocorrelation of 0.039, while the observed index changes have autocorrelation of 0.128. The...

...AR(1) to allow for infrequent trading is a substantial drop in the negative first-**order** autocorrelation in the basis changes for the overall sample period. Where observed index level changes...

...252. To gauge the importance of this reduction, note that the square of the first-**order** autocorrelation coefficient is a good approximation to [R.sup.2]. Since the true [R.sup...of the stocks within the index portfolio. With this control in place, the negative first-**order** autocorrelation in basis changes is noticeably reduced.

V. Summary and Conclusions

The conventional wisdom is...

...fact, that under reasonable assumptions about infrequent trading of index portfolio stocks, strong negative first-**order** autocorrelation could be expected even if no formal arbitrage ever occurred. After all, there are...

...fast moving arbitragers can exploit at the expense of the NYSE's specialists and limit-**order** customers.(23)

Although these stock market/futures market interactions have been the main focus of...

...Process for Observed Index Level Changes

This appendix presents the derivation of the modified first-**order** autoregressive process that describes observed level changes, that is,

[Mathematical Expression Omitted].

where [s.sub...lagged true index level changes, with the property that the weights decline geometrically with the **order** of the lag.(27) More specifically, we write the observed index level change process as...
...and Harris (1989).

2 That dependence can be shown to be very small--on the **order** of 1/T, where T is the number of time intervals remaining in the futures...

...ninety-day futures contract are examined at daily intervals, the basis changes will have first-**order** autocorrelation on **order** of -1/90 or -0.011. For movements over fifteen-minute intervals during a six
...algebraic convenience only. None of the subsequent results rely on this assumption.

18 The first-**order** autocorrelation of the observed futures price changes is [Theta]/(1 + [[Theta].sup.2]). Equating this...

29/6,K/7 (Item 5 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

07221179 **Supplier Number:** 15068645 (USE FORMAT 7 OR 9 FOR FULL TEXT)
1994 market directory issue: more than 600 information technology company listings. (vendors of health technology-related products and services, organizations and events) (Directory)

Feb 15 , 1994
Word Count: 69033 **Line Count:** 06228

...the vendors' products and contact names and numbers. It's as easy as that! All **information** for both sections is provided by the listed organizations via **Market** Directory survey forms.

We hope you find the 1994 Health Management Technology **Market** Directory helpful and easy to use. If you have any comments or suggestions to make our 1995 **Market** Directory even better, please don't hesitate to write or call us at (303) 220...

...Forest Ave. Richmond, VA 23226 (804) 285-9090; FAX: (804) 285-9167 Hal Gurrnieri President **Market**: National HMO/PPO/Managed Care; Long-term Care; Clinics/Group Practices; Physicians Only; Insurance Companies: Home Health Total Installed: 100+ **Price** Range: Platform and number of users dependent Product Name: TIME Total **Information** for Managing Effectively Primary Application: Medical records, chairside charting, electronic claims Hardware/Operating System: IBM...

...and non-medical imaging; Pen windows applications for hand-held computers; database management systems; telephonic **data**-entry and retrieval system Hardware/Operating System: UNIX Sys V Rel 4.0, MS-DOS...

...Palm Harbor, FL 34684 (813) 787-6266; FAX: (813) 787-5235 Felix O'Ryan President **Market**: National All Hospitals; Long-term Care; Clinics/Group Practices Total Installed: 5 **Price** Range: $40,000 to $600,000 Product Name: Abacus Clinical Information System Primary Application: Patient Info., Billing, A/R, Scheduling, Service Delivery, Medical Records, Q/A (Utilization Review, **Order** Communications, Management Reporting) Hardware/Operating System; SUN, Hewlett-Packard, IBM, Sequent, NCR

Abacus, an 11...

...HMO/PPO/Managed Care; Long-term Care; Clinics/Group Practices; Insurance Companies Total Installed: 470 **Price** Range: $2,550 to $109,950 Product Name: LabAccess, RemoteAccess, Remote DMx, Access MedLink Primary Application: Healthcare **Data** Management, Healthcare Financial Management, Remote Communication Hardware/Operating System: IBM PC, IBM RISC, Other RISC President **Market**: DE, NC, VA Clinics/Group Practices; Physicians Only Total Installed: 100 **Price** Range: $7,500 to $250,000 Product Name: AcSel Med A/R Hardware/Operating System...

...San Diego, CA 92121 (619) 455-8600; FAX: (619) 597-6030 Renee Lawrence Mktg. Coord. **Market**: National All Hospitals; HMO/PPO/Managed Care; Long-term Care; Clinics/Group Practices; Physicians Only; Insurance Companies; Home Health **Price** Range: $195 to $495 Product Name: XoftWare for Windows DT, XoftWare/32 for Windows, XoftWare...Burlington, VT 05402 (800) 336-1776; (800) 864-7227; FAX: (802) 864-0056 Diane Kavanaugh **Market**: National All Hospitals; HMO/PPO/Managed Care; Long-term Care; Home Health **Price** Range: Call for more **information** Primary Application: Comprehensive Nursing Home and Home Health Systems Hardware/Operating System: IBM AS/400...Patient Acuity/Classification, Infection Control, Incident Reporting, OR Management, Physician Orders,

Nurse Costing, Resource Scheduling, **Order** Entry and HRMS/Physician Credentialing.

Andersen Consulting Spear St. Tower, One Market Plaza San Francisco ...

...75074 (800) 767-3357; (214) 422-1022; FAX: (214) 516-3460 Robbie Dennis Hollis Mktg. **Market**: National; Mexico, Canada All Hospitals; HMO/PPO/Managed Care; Clinics/Group Practices **Price** Range: $50,000+ Product Name: Answers Medical **Information** Systems Primary Application: Medical laboratories Hardware/Operating System: Digital Equipment Corp. VAX, ULTRIX, Alpha, and...Range: $10,000+ Product Name: HIMS, Practice Plus Primary Application: Accounting, Medical Records, Pharmacy, Lab, **Order** Entry, Imaging Hardware/Operating System: HP-UX, SCOUnix, DOS

Automated Health System, Inc. designs and...

...60521 (800) 888-8717; (708) 574-6749; FAX: (708) 574-6121 Erich Steinert VP, Sales **Market**: Canada All Hospitals; HMO/PPO/Managed Care; Long-term Care; Clinics/Group Practices; Physicians Only; Insurance Companies; Home Health **Price** Range: $200+ Product Name: Treatment Oriented Profiles (TOP/S)

Collect, manage and **market** physician targeting and profiling **data** on treatment patterns and practice characteristics. Provider of lists, databases and information services for market integration of unique software applications for **order** entry, results display and clinical data entry to achieve a true interdisciplinary clinical information system ...Price Range: $295 to $645 Product Name: QMR patient diagnostic software; AskRx drug information software, **Ask** Advice Primary Applications: Patient-diagnostic assistance, drug information and interactions and patient drug education software...

...Convention, Inc., is a full-featured information and prescription-writing program on 5,000 drugs. **Ask** Advice generates a patient handout written in lay terms for over 600 different drugs.

CAMDE...

...service operations. Interfaces have been developed to electronically transfer data from the hospital's ADT, **order** entry, lab, pharmacy and materials management systems to and from the dietary system.

James E...Product Name: Menu Management System, Professional Diet Analyzer, Diet Office Management System, Inventory Management System, **BID** Analysis System/Nutritional Accounting System, etc. Primary Application: Food and nutrition services management, cradle to...s full-function system, including modules for general laboratory, microbiology, anatomical pathology, blood bank, and **order** communications, exploits the power and cost efficiencies of today's advanced networking technology.

CIVITEC Healthcare...

...207 Austin, TX 78705 (512) 452-7261; FAX: (512) 452-2390 Mark Nagel Sales Mgr. **Market**: National All Hospitals Total Installed: 7 **Price** Range: $30,000 to $600,000 Product Name: EM Stat

Primary Application: Emergency Department

Information System Hardware/Operating System: Client Server Architecture - UNIX/PC

CRS develps, markets installs and supports...Boulder, CO 80301 (303) 443-9660; FAX: (303) 442-4916 Julie Bortos Mktg. Comm. Mgr. **Market**: National Hospitals with up to 600 beds Total Installed: 26 **Price** Range: $3,500 Product Name: CliniCare System Primary Application: Clinical **Information** System Hardware/Operating System: Proprietary and third party hardware with a UNIX operating system CliniCom...

...Group Practices Price Range: $10,800 to $100K Product Name: Data Tech/PolyTech Primary Application: **Order** entry, result reporting, quality control, work load accounting Hardware/Operating ...and others/UNIX

CCA provides turnkey solutions for the pharmacy market. CyberMED features complete order **processing**, profiling, floor stock, MARs, report writer, bar coding, HL7, outpatient systems and more. The CyberMED ...55124 (612) 431-4990; FAX: (612) 431-4989 Nancy Vetter Sales/Mktg. Support Mgr. Market: **National** All Hospitals; HMO/PPO/Managed Care; Clinics/Group Practices Price **Range**: $55,000 and up Product Name: PREMIER Series Laboratory Information **System** Primary Application: General laboratoy microbiology, anatomic pathology, blood bank Hardware/Opeating System: IBM AS/400...installs and supports a full range of healthcare applications, including financial, medical records and order **cmmunications**. The systems are written in COBOL and run on IBM compatible microcomputers usingg Novell Netware...Application: Patient registration/tracking systems, patient billing, medical records, payroll, G/L, A/P, order **entry**, materials management, electronics claims Hardware/Operating System: IBM AS/400

A fully integrated healthcare information...is an integrated clinical and financial package on IBM AS/400. The systems include order **entry** , treatment plan, progress rates, referral management, self developed assessment forms, intake, patient quality, scheduling, billing...records, A/P, G/I, P/R, materials management, pharmacy, query, time and attendance, order **entry**, results reporting bar coding and microfiche reporting. Physicians system can stand alone or interface with...to $50,000 Product Name: Enterprise Hub Primary Application: Network connectivity for Ethernet, Token Ring, **FDDI**/ATM and integration services.

Hunter International 27350 SW 95th Ave., Ste. 3044 Wilsonville, OR 97070...North America All Hospitals; Long-term Care Total Installed: 200 Primary Application: Care plan, order **entry**, result reporting, pharmacy, labs, diagnostic imaging, patient registration, medical records, resource scheduling, payroll, etc. Hardware...post implementation review. Functional specialists in general and patient accounting, cost accounting, case mix, order **communications**/patient care, clinical/ancillary departments, medical records, and executive information systems.

Inforamtion Resources Products, Inc...

...95826 (800) 695-4447; (916) 368-4090; FAX: (916) 368-4984 Don Ratcliff President Market: **National**; Canada Total Installed: 650+ Price **Range**: Price **vary** by module Product Name: ChartScript, ChartStat, ChartFact, ChartLocator, ChartRescue, ChartRelease, ChartID Primary Application: Health information **mangement** Hardware/Operating System: IBM or compatible 386 or 486. DOS 3.3 or higher, operates...less than 150 beds) Primary Application: Pt. registration, Pt. accounting, med records, nursing, financials, order **comm**. Hardware/Operating System: IBM AS/400, OS/400

IHS offers integrated software for the healthcare...Systems, Inc., develops and supports the MAINSAVER computerized maintenance management system. Mainsaver provides work order **control** and preventive maintenance scheduling capabilities as well as inventory control and purchasing control for maintenance...

...DOS-hardware independent

Developers of a Point of Care Clinical Information System with integrated Order **Management**, Managed Plan of Care and Critical Care capabilities. System runs under UNIX or DOS and...

...and a working knowledge of all communications protocols (including FDDI, ATM, SONET, Ethernet, Token Ring, **etc**.), has enabled us to successfully provide solutions to communications problems at well over 100 healthcare...IBM 486 compatible, DOS protected mode PLRAS transfers

laboratory tests from lab to physician, order **tests**, and supplies. Analyze results via rule and procedure based expert system, presents graphic cumulative reports...

...SCO Unix/Xenix

Pharmworks is designed to computerize the admissions, pharmacy, inventory control, purchase order, **durable** medical equipment (for pharmacy) and accounts receivable departments for retail/out-patient and home infusion...The system includes real-time patient-tracking, Color Status Boards(s), COI, QA, Triage, Order-**Results**, LOG automation, and Aftercare-Instructions.

Lowry Computer Products, Inc. 7100 Whitmore Lake Rd. Brighton, Ml... beds; Longterm Care Product Name: Xmplar 6000 Series Medical Information System Primary Application: Admitting Order **Entry**, Results, Reporting, Laboratory, Radiology Hardware/Operating System: IBM RISC System 6000. UNIX

MJSD supplies the...

...fully integrated modules are available for ADT, CPI, health records, laboratory, pharmacy, diagnostic imaging, order **entry**, patient care and results reporting. Touch screens and ad-hoc information are featured.

MMC Healthcare...

...departmental application clients served by a hospital wide data base. PRO Station functions include order **communications**, results reporting, registration/ADT, pharmacy, radiology, lab, critical paths and documentation.

MacNursing 165 Outrigger Dr...point of care nursing systems, documentation activity and staffing. Included are A/D/T, order **entry**, result reporting, departmental communications, pharmacy (including formulary and pharmaceutical), radiology results reporting, physician communications, and...Melville, NY 11747 (516) 423-7800; FAX: (516) 423-0161 John Esposito VP, Sales Market: **National**; Canada All Hospitals Total Installed: 125 Price **Range**: $20,000 to $250,000 Product Name: HEMOCARE Primary Application: Blood Bank information **system** Hardware/Operating System: IBM-AIX RISC/6000, IBM ...
Management System, DataStat Outpatient Care System, DataStat Consultant, DataStat Nursing Home System, DataStat Mail Order **Pharmacy** System Primary Application: Pharmacy (including inpatient, outpatient, HMO, mail order, **nursing** home and home health), medical, dental applications Hardware/Operating System: IBM PS/2 micro, DEC...
...of healthcare products, including pharmacy, dental physician office, nursing home, home health, HMO, mail order **and** consultant software. The systems operate on a range of hardware, including IBM micros, DEC and
...urgen care clinics, providing all functions for operation and management, including registration, patient and order **tracking** record-keeping, report generation, statistics and graphs. EDNet runs on industry-standard PC hardware under...

...510) 849-8243 (800) 654-5858; FAX: (510) 841-3628 Cilla Devries Mktg. Mgr. Market: **National**, Canada Total Installed: 350 Price **Range**: Client version on MicroSoft Windows begins at $595 Product Name: Natural Language Primary Application: Data **access** and reporting tool Hardware/Operating Systm: RDBMS (Oracle, Sybase, Informix, Ingres) and most popular H...Sunrise Ave., Ste. A-1 Roseville, CA 95661 (916) 773-2852 Nancy Greene Product Information **Market**: **National**; Canada Hospitals with over 600 beds; Long-term Care Price **Range**: $475 to $975 Product Name: On-Line Consultant Primary Application: Management consulting computer system selection...program includes registration, historical training records, certification, budget, lending library and more.

Patient Care Information **Systems** 6581 Lafern Ct. San Jose, CA 95120 (408) 997-7835; FAX: (408) 374-1472 Rick Bylina President Market:

National All Hospitals Price **Range**: Variable, based on configuration Product Name: NurseMate, SmartChart, PDXX Primary Application: Ward information **systems**, point of care Hardware/Operating System: Open system

PCIS builds, installs, and comprehensively supports ward design and flow, clinical monitoring and reporting, fast order **entry**, inventory/floorstock/controlled substances management, billing, hospital ADT/billing interfaces, concurrent DUE, and flexible "IQ...laundry services. These systems run on PC-based networks that are Novell, IBM/Token Ring, **VAX**/VMS compatible, and use DOS and Windows operating, systems. They can interface with other health...include PC/LANs and UNIX-based systems from IBM, Hewlett-Packard and Data General.

Ring **Medical** Communications Services, Inc.

85 Rangeway Rd. North Billerica, MA 01862 (508) 670-2100; FAX: (508 ...Clinics/Group Practices; Physicians Only Total Installed: 500+ Price Range: On a price quote basis **by** request Product Name: ACCLAIM Medical System

ACCLAIM is an expandable, turnkey, PC-based medical billing... enterprise information systems and services. The TDS 7000 Series is optimized for direct order entry/**results** reporting by physicians, in addition to use by other caregivers. The systems supports industry open... 68510 (402) 483-7831; FAX: (402) 483-7846 Linda Barnett Dir. of Mktg. Market: National **All** Hospitals; Clinics/Group Practices Total Installed: 130 Price Range: $**100**,000 to $250,000 Product Name: ILS-5 Laboratory information system, **anatomic** pathology system Primary Application: Laboratory Information system Hardware/Operating System: IBM AS/400, OS/400...

29/6,K/8 (Item 6 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

05582755 **Supplier Number:** 11562397 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Automation of securities markets and regulatory implications. (includes index of special features published in Financial Market Trends, periodical, 1977-1991) (Special Feature)

Oct , 1991
Word Count: 16729 **Line Count:** 01397

...an almost ideal way to computerisation. This is notably the case for processes such as **order** collection and **order** routing; the price determination process be it a single price auction, a continuous price auction or a market making process); **order** execution, confirmation and comparison ("matching"); clearing and settlement; notification of **order** execution to buyers and sellers; trade reporting both for market surveillance and market information purposes...

...a world-wide market system. The time frame within which processes and procedures such as **order** routing, **order** execution and the dissemination of market information take place is shrinking fast and is approaching...

...no longer valid. Ingenious portfolio managers increasingly operate cost-efficient, safe and fast "on-line" **order** routing systems which link them directly with afl major financial centres of the globe.

In...

...concerned, regulation could subsequently be enacted according to which the introduction of automated systems for **order** routing, trading, **order** execution, clearing and settlement etc. would be subject to notification and examination procedures so that...the following functions and processes lending themselves to automation:

a) The securities transaction process

i) **Order** collection and **order** routing

Two steps may be distinguished:

order collection from ultimate buyers and sellers;

order routing from the **order** collectors to the members of the stock exchange or OTC markets i.e. to the...

...this system requires a continuous feeding of buy and sell orders into the screen-based **order** confrontation system while in the aforementioned system all buy and sell orders are collected by...

...establishing the opening price.

with one market maker (specialist), or several competing market makers, providing **ask** and **bid** prices on a continuous basis during trading hours; the prices quoted on the screen may...

...amounts bought or sold; to the extent that a market maker system displays its "limit **order** book" it resembles an automated auction system.

iii) **Order** execution, confirmation and comparison ("matching")

Once the price applying to a particular buy or sell **order** is established various steps of processing are necessary for executing the buy (sell) **order** together with the other side of the deal i.e. the corresponding sell buy) **order**. Instructions need to be given to the depository system(s) involved for effecting the transfer...

...solutions to the computerisation of these clearing and settlement processes is available.

v) Notification of **order** execution to sellers and buyers

This process corresponds largely to a "reversal" of the **order** collection and **order** routing process referred to under i); these two processes together - i) and v) - are sometimes referred to as **order** book handling. This typical "back office" activity also lends itself to full automation ("electronic client **order** book").

b) Market information systems

Once securities prices are determined via the auction or trading...

...new quotations. Information on current quotations may for transparency/visibility reasons be combined with corresponding **information** on trading volume ("last trades reporting"). Automation efforts have often concentrated in particular on this aspect of the "functioning of markets". **Market information** systems in a wider sense may also include the dissemination of company **information** which is relevant for the equity **price** formation process. A particular aspect of automated **market information** systems is the computation, at short-term intervals (every minute for example), of share **price** indices without which markets for index futures could not operate.

c) **Market** surveillance systems

Organised securities markets are generally obliged under their rules of procedure to supervise trading activity with a view to identifying irregular trading behaviour. The computerisation of the **price** determination process or of current trade reporting opens up unique opportunities for facilitating the **market** surveillance process. All that is needed is to feed **data** on all aspects of trading

price, volume and time of each deal) into a separate surveillance and **information** storage system ("audit trail").

d) National and international **market** linkages

In countries with several stock exchanges or market systems, computerisation is increasingly used for...

...require efficient computerised real-time price dissemination and price comparison systems as well as fast **order** routing systems between the local markets. International linkages between national market-places begin to be...highly automated dealing systems while still being faced with serious problems at the level of **order** routing or clearing and settlement. As regards the level of automation, there may also be...

...traditional, sometimes several hundred year old, stock exchanges have sometimes been slow in implementing automated **order** execution, trading or other systems relating to the technical operation of securities markets. In the...
...Canadian Depository for Securities (CDS) and while major securities houses and specialised service firms have **order** routing systems in place which operate on a nationwide basis, there are considerable differences in...

...subject to considerable automation efforts, essentially through the introduction of two systems: first, MOST ("Market **Order** System for Trading") which guarantees execution of market orders at the quoted price for up...

...designated stocks and not less than 599 shares for any other stock; second, LOTS ("Limit **Order** Trading System") which provides a screen-based limit **order** book for all stocks traded on the floor. In addition, the Toronto Stock Exchange operates...

...The Montreal Stock Exchange introduced in 1983 its MORRE System (the "Montreal Exchange Registered Representative **Order** Routing and Execution System") which is an automated small **order** execution system providing best execution for Montreal-Toronto listed shares for orders ranging between 599...

...are covered by the system. MORPE will soon serve specialist needs with an electronic limit **order** book that sorts orders and writes confirmation tickets. FAST, the fully automated securities trading system ...

...Bourse were traded through the computerised CAC System, which is essentially a centralised screen-based **order** book system in which matching orders are automatically executed. Parallel to the phasing-in of ...

...considerable automation efforts have been made in two directions: first, in the complex field of **order** handling (the collection, routing, and confirmation of orders, and more generally the management of client **order** books by banks and stock exchange member firms); second, in the field of real-time...e. to introduce some elements of market making; further improvements in the field of small-**order** handling, and the extension of home banking facilities (via Minitel) to the securities market area...

...custodian services;

improvement in the dissemination of real-time market information;

further development of automated **order** routing systems.

At present, the following automated **order** routing systems are in operation:

BOSS ("Borsen-**order**-service-system") for options, partially introduced at the Frankfurt Stock Exchange in January 1989; BIFOS...
...Dusseldorf Stock Exchange in October 1988. The latter system appears to have considerable potential for **order** handling in general as well as for developing effective real-time linkages between the German...

...markets.
Major achievements that may be mentioned in this regard are:
the introduction of RIS ("**Ring**-informations-system) in 1986/87 (providing real-time information on quotations, last trades and company...

...be fully operational in 1992 and will then function as a fully automated and integrated **order** routing, **order** matching, **order** execution, market information (including trade reporting), and clearing and settlement system.
United Kingdom
In the...

...Quotation") System which was originally modelled on the NASDAQ System in that both systems are **quote** driven, competing market maker systems. However, the resemblance between the two systems is no ...before "Big Bang" i.e. in 1985.
Automation efforts have more recently concentrated on improving **order** routing and execution systems as well as the clearing and settlement process. The International Stock Exchange in London (ISE) has in recent years put into operation a small **order** execution system: SEAF ("Stock Exchange Automated Facility"), which competes with two private systems put into...

...Corporation (SIAC) in New York City. Plans for a similar real-time dissemination of option **market information** developed by the Options **Price** Reporting Authority (OPRA) are at present under consideration by the SEC.
The history of automated **order** routing and execution systems started in 1969 with the introduction by the Pacific Stock Exchange (PSE) of its COMEX System, now called SCOREX "Securities Communication **Order** Routing and Execution") which in fact is an automated small **order** routing and execution system that executes orders of up to 1 099 shares in eligible securities at best **bid** or offer prices that are available at the Intermarket Trading System (ITS; for ITS see...

...System also executes market limit orders (up to 2 099 shares) at the ITS best **bid** or offer price.
The NYSE and AMEX introduced floor automation systems in 1976 (DOT = Designed **Order** Turnaround System) and 1977 (PER = Post Execution Reporting), respectively. DOT is essentially an automated **order** routing system with automated execution capabilities through which orders are routed from broker offices to...

...passed through the DOT System, which thus handles about 70 per cent of the NYSE **order** flow. One application of DOT is OARS ("Opening Automated Report Services") through which orders of...

...the - already mentioned - Intermarket Trading System (ITS) which was introduced in 1978. ITS is an **order** routing system based on real-time quotation information which effectively links all US stock exchanges and the NASDAQ market enabling brokers to identify on a real-time basis best **bid** and offer prices for interlisted, securities and channel their orders accordingly.
Options exchanges have also developed automated floor systems for **order** routing and execution. Thus, the Chicago Board Options Exchange (CBOE) introduced in 1985 RAES ("Retail...this context: INSTINET

and POSIT. Both systems have been authorised as broker systems and provide **order** display and certain **order** execution capabilities, essentially for institutional trades. INSTINET (owned by Reuters) maintains also international linkages through...

...of neither the traditional stock exchanges nor the NASDAQ market. PORTAL, an automated quotation and **order** execution system for privately placed securities, was introduced in June 1990 in response to SEC ...

...years, or are in the process of taking steps, towards improving market information systems and **order** routing systems on the one hand and the clearing and settlement process on the other...

...is noteworthy that a number of stock exchanges not so far mentioned have introduced automated **order** book - or **order** matching - systems of the type developed by the Toronto Stock Exchanges i.e. the CAT...

...following the example of the Paris Bourse. The Tokyo Stock Exchange introduced CORES ("Computer Assisted **Order** Routing and Execution System"), which is also based on the limit **order** book - or **order** matching - principle, in 1982 for equities listed in the Second Section. The system was designed...

...trading going back to 1962. A special feature of CORES, in contrast with other computerised **order** matching systems, is that the official broker, the Saitori, has maintained his function in the **order** matching process. CORES covers some 1350 equities thus leaving some 150 equities to traditional floor...

...other stock exchanges in South-east Asia (Hong Kong, Singapore, Kuala Lumpur) apply the same **order** confrontation principle (auction price method) as used by CATS in Toronto; many exchanges have, however...

...Copenhagen, Oslo, and Rio de Janeiro which now operate as fully automated and integrated information, **order** handling, trading and clearing and settlement systems.

It should be mentioned in this context that...

...member firms as well as certain third parties (presumable including supervisors); third, facilities for automated **order** routing, **order** execution and confirmation, and automated clearing and settlement instructions and procedures.

Market integration efforts amongst...

...Nordic stock exchanges are now interlinked via real-time quotation information systems while cross-border **order** routing is still carried out via ...kind of resistance against the inclusion of the most actively traded shares in existing automated **order** matching systems is still being felt at the stock exchanges of Australia, Tokyo and Toronto.

In a record of failures, ARIEL - a London based automated **order** matching system for institutional trading - should be mentioned as well. The failure of the US...

...efficiency of market functioning can be greatly improved through adequate computerisation of processes such as **order** collection, **order** routing, **order** concentration in the price determination process, **order** execution, confirmation, clearing and settlement. The higher the level of automation of these technical/mechanical...of technology in several respects. First, technology designed to enhance the process of dissemination of **market information** (**price information**, volume **information**, company **information**)

can, and often does, improve the visibility of markets substantially as **market** professionals and investors can, and do, receive this **information** increasingly on a real-time basis as well as on a wide geographical, even worldwide, basis.

Second, technology can greatly enhance the **market** integration process not only through better **information** but also insofar as screen-based quotation, **order** confrontation, or **price** determination systems no longer require the physical presence of brokers and dealers on a centralised...

...market system with all the beneficial effects this has from the point of view of **order** concentration, market depth, liquidity and visibility as well as from the point of view of...thus providing real-time opportunity for intervention both at company level and trading level in **order** to clarify the situation. The most advanced surveillance systems have also techniques in place which...

...as well. This applies in particular to so-called proprietary market systems and to commercialised **order** routing systems that are used by smaller broker-dealer firms which find it too costly to develop their own in-house **order** routing systems. Systems that may be mentioned in this context are INSTINET (owned by Reuters) and POSIT which are automated **order** confrontation systems with some automated **order** execution capability, and ADP, the largest company offering automated **order** routing services.

In reviewing automation projects falling under its approval mandate the SEC generally proceeds with normal **order** flows but also to accommodate substantial surges in trading volume. Under the impact of the ...

...place and whether codes of conduct applying to broker-dealer firms are respected as regards **order** priority, best execution etc. The effects of such systems on price efficiency are also examined...

...Another example is the recommendation that specialists should provide real-time information on their limit **order** books; the dissemination of this information is considered by the SEC as particularly helpful at...

...prices at the trading session, as this would help market participants to adjust to any **order** imbalances that might appear in the limit **order** books at this moment.

ii) Main issues

The present sub-section attempts to identify and...to the following aspects of automated systems: adequate capacity, technical reliability of functioning, operating cost, **market** coverage (which is relevant for the **price** determination process, **market** depth and liquidity), **market** visibility (adequate and timely **information**), competition aspects (degree of openness as regards system access).

The relationship between efficiency and competition...

...fairness would, inter alia, relate to the fair treatment of client orders with regard to **order** priority and pricing best execution principle).

A major point on the "checklist" under the heading...

...and other regulated market systems are moving forward towards developing automated or computer-assisted quotation, **order** execution and trading systems and exploring ways and means of setting up international trading linkages...are concerned: the continuous auction system which operates on the principle of a public limit **order** book in which orders that match in size and price are executed automatically; and market maker systems in which competing market makers continuously **quote**

ask and **bid** prices at which they are prepared, or obliged, to trade or negotiate in reasonable or...

...other price negotiation techniques than the price setting procedures applying to retail markets.

While the **order** book technique - with price and volume, or volume-only indications - may be an appropriate approach...
...the operational terminals through which trading - competitive price bidding, exposure of orders and eventually automated **order** execution - takes place: Who should be authorised to have access to the terminal network? What opening price in an **order** confrontation - or auction - market system such as CATS; second, the scope for pre-arranged **order** , or quotation, input.

It seems that in developing automated auction systems the question of how...

...be tempted to move the market into a desired direction via last-second pre-opening **order** input (19). As has already been indicated, the establishment of the opening price is important...

...mandatory use of automated trading systems could lead to a certain practice of pre-arranged **order**, or quotation, input which may be intended to move the market in a desired direction...

...to access real-time market information;

adequate real-time quotation and "last trade" reporting;

limit **order** book disclosure.

While there is no doubt that these principles can technically be implemented through...

...matter from the point of view of fair and equitable markets?

As far as limit **order** book disclosure is concerned it is important to note that a major difference between a market maker system of the NASDAQ or SEAQ type, and an **order** confrontation system of the CATS type, indeed concerns this particular point. While CATS type systems ...

...Janeiro, Taipei, Kuala Lumpur, Australia etc. practically work on the principle of a disclosed limit **order** book, such information is usually not available to participants in a market maker system. If in the latter type of system, market makers were required to report their limit **order** books to the system, which in turn would combine this information so that the system as a whole would display an integrated limit **order** book for each share, market maker systems and **order** confrontation systems would indeed become very similar. Indeed, it can be argued that in market...

...specified amounts which market makers display on their terminals have essential characteristics of a limit **order** book.

5. Market integration

As modem securities market technology provides unique potential for the integration...

...securities traded in several regional stock exchanges (inter-listed securities), the third system also provides **order** routing capabilities which enable brokers to execute orders for inter-listed securities flexibly and expeditiously...be the introduction of a combined automated real-time quotation dissemination system combined with an **order** routing system which could be modelled on the United States Intermarket Trading System (ITS). Automation...

...a link-system could be further enhanced by the introduction of automated

floor systems for **order** confrontation, matching and execution systems similar to those used at the New York Stock Exchange...account for a relatively high proportion of transaction volumes in securities markets, banks with extended **order** collection networks are making considerable efforts to develop efficient in-house **order** routing systems for small **order** handling. See, for example: Luc Andre, Computer-assisted continuous trading: a reality for all clients...

...of equities of the privatised firms.
19. Opening price procedures received special attention when automated **order** matching and execution systems were introduced at the stock exchanges of Paris, Australia and Vancouver...

...Australian Stock Exchange it has been found useful to reduce the scope for last second **order** input designed to influence the opening price by using discretionary deviations of plus or minus...

29/6,K/9 (Item 7 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

04600574 **Supplier Number:** 08527360 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Slamming the foot in the door. (Eurobond salespeople)

May , 1990
Word Count: 4638 **Line Count:** 00347

...a big difference two treasury bonds but between two Eurobonds with say a 50 bp **bid**-offer spread, it can take one year for a 20 bp pick-up to pay...

...would have told a house ‘look I can buy these bonds elsewhere cheaper than your **bid** price’. Now, when you see those 1/4s and 1/8s you pounce on them...a question that brings some fruity replies: "A good salesman? That’s one who never **rings** you up." One critical fund manager says: "A salesman is someone who can convince the...

...bp’. Some salesmen will do it, some are just too timid to get a better **price** from the traders."
What active investors prize above all is **market information**. That is a very different and more valuable commodity than general market research. Institutional investors...of Eurobond firms. But he still sounds a little bitter about the issue. "If you **ask** me what I would most like to see improved, it would be liquidity. I understand ...

...largest issue can be locked away and that reduces marketability. But not to obtain a **bid** offer **quote** or to obtain spreads so wide - I have found that a little difficult to accept...

...syndication methods which the most powerful lead managers have introduced in an effort to restore **order** and profitability to the market. Investors’ feeling about fixed price re-offerings vary from cautious...

29/6,K/10 (Item 8 from file: 148)
DIALOG(R)File 148: Gale Group Trade & Industry DB

04165265 **Supplier Number:** 08792171 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Program trading of equities: renegade or mainstream?

Nov-Dec , 1989
Word Count: 6072 **Line Count:** 00503

...Many have also tried stock swapping services such as Instinet and Posit, which are stock **order**-matching services that attempt to match buyers and sellers off-exchanges for low commissions.
Recently...

...managers who have indicated an interest to take the other side of trades offered or **bid** into the stock market. Knowing that a large quantity of a particular issue is available...

...discussing portfolio trading in the context of trading lists of stocks using the NYSE automated **order** entry system (SuperDot) and stock index futures. It is worthwhile to explore the features, advantages...used even today when other systems are unavailable). In 1975 the NYSE initiated the Designated **Order** Turnaround (DOT) system, which was designed primarily to handle retail trades of up to 2...

...the floor and to receive execution reports. They connect the DOT system to their own **order** processing software to make the handling of these trades even more automatic. Portfolio orders for...

...specifications and typical market liquidity. The American Stock Exchange and NASDAQ systems also developed automatic **order**-routing systems, so an S&P 500 portfolio could be executed within minutes. Portfolio trading...
...issues and must treat the portfolio trader in the same way as any other stock **order** being received via the DOT system. However, in deciding on a **price** at which to execute the **order**, the specialist has **information** relating to the aggregate **market** and limit **order** flow in that stock and has more difficulty hedging the execution risk than does the...

...in large blocks of individual stocks. Recently, the NYSE proposed a new market-on-close **order** that will allow for crosses to occur at the closing price of each stock.
One...through the DOT system, traders allow for some slippage in deciding when to initiate an **order**. A shortage of liquidity in comparison to the volume of arbitrage trades attempted to be...MBS), a portfolio trade of 500 stocks is effectively executed in a bundle with one **order** that is settled with physical delivery of 500 stocks.
In the NYSE's version of...

...makers, one of which is the aggregation of specialists' bids and offers, will be quoting **bid** and **ask** prices on the S&P 500 index.
All market makers will have access to the electronic **order** book. The benefit of ESPs and MBSs is the availability of an S&P 500...

...at the open and close, and for crosses or arbitrage within the trading day Arbitrage **bands** between the futures and ESP index **quote** will tend to be narrower because of the ease of executing the arbitrage trade when...

? t /9/1,5,8,10

Dialog eLink: USPTO Full Text Retrieval Options

29/9/1 (Item 1 from file: 15)
DIALOG(R)File 15: ABI/Inform(R)

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Circadian rhythms: The effects of global market integration in the currency trading industry

Zaheer, Srilata

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Abstract:

The impact of global market integration is assessed in the currency trading industry as the market interfaces with states, with firms and with individuals, and questions are raised for research from a variety of disciplines. Issues discussed include the question of state control in global markets, the impact of globalization on firm structures and processes, how firms can derive competitive advantage from global circadian rhythms, and the influence of the circadian rhythms of the global market on individuals who work in this industry.

Text:

Abstract. This essay assesses the impact of global market integration in the currency trading industry as the market interfaces with states, with firms and with individuals, and raises questions for research from a variety of disciplines. Issues discussed include the question of state control in global markets, the impact of globalization on firm structures and processes, how firms can derive competitive advantage from global circadian rhythms, and the influence of the circadian rhythms of the global market on the individuals who work in this industry.

What does global market integration in an industry mean for the states, the firms and the individuals that are touched by this process? This question, at one level, is a very old one, drawing on the debate that addresses whether a techno-economic logic drives convergence across societies

[Dunlop, Harbison, Kerr, and Myers 1975] or whether, in fact, differences in historic developmental paths and institutional and cultural factors override any such technological determinism and result in persistent country-level variations [Piore and Sable 1984; Dunning 1993]. At the same time, the question is also a new one, as the kind of integration that we are witnessing in some sectors is qualitatively different from the "separate but similar" logic of early writers on convergence, representing instead the enlargement of market boundaries in what has been termed "market fusion" [Kobrin 1994]. The effects of such market fusion are already being felt in the international financial services industry [O'Brien 1992; Barnet and Cavanagh 1994], at its interfaces with states, firms and individuals working in the industry.

At the level of the state, the effect of global market integration is linked to the debate on the limits to national sovereignty [Vernon 1971; Wriston 1992], from the emergence of globally integrated market segments and globally integrated industry networks that act to reduce the importance of the nation as a unit of analysis [Kobrin 1994]. On the other hand, at the level of firms in an industry, the parallel debate in international management has often highlighted the persistence of country effects in the face of increasing market integration. This persistence has been attributed to multiple factors - to national institutional structures [Porter 1990] and the 'imprints' on firms at the time of founding from the home-base [Kogut 1992], to firms' administrative heritage [Bartlett and Ghoshal 1989], to political and cultural drivers of 'local responsiveness' [Prahalad 1976], and to competing 'isomorphic pulls' on multinational subsidiaries from their home, host and global environments [Rosenzweig and Singh 1991; Westney 1992; Zaheer 1992]. At a fundamental level, all of these theories essentially address similar questions - to what extent country-related factors such as culture, administrative heritage, and the concept of national sovereignty continue to matter in industries subject to a high degree of global market integration.

In addressing this question, I have chosen a largely descriptive, exploratory approach, examining an industry (foreign-exchange trading) which by almost any measure, is one of the most globally integrated segments of an already global financial services industry [Walter 1988; Ohmae 1990]. I draw on a variety of sources, including public secondary data and news reports, data obtained from suppliers to the industry and firms within this industry, as well as primary data from observation, interviews and surveys conducted at over forty trading rooms in New York, Tokyo, Singapore, and London. Using these data, I have attempted to put together a profile of a highly globally integrated industry and the effect global market integration in this industry appears to have had on states, on firms and on the individuals who work for these firms.

In the rest of this essay, I first describe the global foreign-exchange (FX) market and some of the key characteristics - the extent of global integration, speculation and the circadian rhythms of the market - that make it interesting. The rest of the paper deals with the effects of global market integration at different levels of analysis - the state, the industry, the firm, and the individual trader. At the level of the state, I discuss how the global integration of the FX market has collided at times with the sovereignty of states, and discuss the experience and implications of regulation in this industry. I then discuss the industry, with particular emphasis on the relationship between technology and global market integration and between multinational competitive advantage and the circadian rhythms of the market. I go on to discuss what globalization has meant for the structure, systems and culture, or the anatomy, physiology and psychology [Bartlett 1986] of firms operating in this industry. Finally, I describe a day in the life of an individual trader in New York. In each section, I raise questions that are of theoretical and empirical

interest to researchers in international business from a variety of perspectives.

THE GLOBAL FOREIGN-EXCHANGE MARKET

The global foreign-exchange market essentially consists of a primary network of interbank dealers in which about 1000 affiliates of approximately 150 major international banks are on one side of over 80% of the transactions, a secondary network of around 4000 second-tier banks(1) involved in active speculation and trading on behalf of customers, and a tertiary network of fund managers, corporations, central banks, and other 'customers' which conservatively could exceed 20,000 organizational participants. These networks are distinguishable by two characteristics. The first is whether the members act as 'market makers' - banks who always **quote** two-way prices (a '**bid**' and an 'offer' price) when asked for a quotation in the inter-bank market, indicating they are prepared to buy or sell that currency. The second characteristic is the extent to which their members act as 'informed traders' taking speculative positions in different currencies based on privately informed opinion about market expectations of price trends, rather than as 'liquidity traders' changing one currency asset for another to meet some real need without primarily focusing on expected price trends in those assets [Admati and Pfleiderer 1988]. The primary network consists of the major market-makers. These market-making banks **quote** twoway prices on the inter-bank market, take speculative positions on their own account and trade with customers. The secondary network of banks will typically be involved in both speculative trading and trading with customers, but may only occasionally **quote** two-way prices, while the tertiary network is the network of customers, who are primarily liquidity traders. However, all of these types of market participants are likely to act as both liquidity traders and as informed traders, though with differing emphases.

In the mid-1970s, the Bretton Woods agreement of fixed exchange rates started to break down and the move to floating rates was formalized in the Jamaica Agreement of 1976. Since then, the nature of the market changed from being primarily customer-driven to a much more speculative market [Ohmae 1990] and the extent of global market integration increased substantially. Indicators of the increasing market integration are evident from the fact that the number of countries from which banks are active as market-makers and the number of banks worldwide that act as market-makers both doubled over a twenty-year period [Hambros Bank 1974-1993].

In April 1995, the global foreign exchange market had a net turnover of 1.23 trillion dollars a day [Bank for International Settlements (BIS) 1995], after eliminating all double counting of transactions (as there are two parties to every deal). The net daily exchange market turnover worldwide in 1992 was $820 billion and the comparable figure in April 1989 was $590 billion. This represents an acceleration in the rate of growth in the market from 12% to 14% per year.(2)

London, New York and Tokyo still dominate the global currency market, with a combined net exchange market share of 56% in April 1995 (up from 54% in 1992). The dollar is on one side of 83% of transactions in the global foreignexchange market, though the proportion of 'cross-currency' business, not involving dollars, is increasing rapidly. The German mark is on one side of 37% of transactions, while the yen was on one side of 24% of all transactions.

Global Integration in the FX Market

There is no central exchange in this market, no clearing house or 'pit' where buyers' and sellers' bids and offers are matched.(3) Instead, a vast

global network of electronic dealing systems (an interactive electronic mail system where traders can **ask** for prices from a particular bank and accept or reject the offer) and phone lines connect traders around the world. Market prices are supplied from another screen (usually, the Reuters monitor system) which relays the latest indicative prices fed into the system by participating banks. The average volume of international conversations on the Reuters electronic dealing system which links about 4,000 banks worldwide with around 18,000 terminals, and is reported to have a 96% market share in all electronic dealing in this industry [Euromoney, May 1993], runs at around 10,000 conversations per hour, and can go up to 40,000 conversations per hour during peak periods (see Figure 1).

One of the factors that makes the FX market a truly global market is the fact that it is not embedded in any particular location (unlike the Chicago Mercantile Exchange or the New York Stock Exchange). Other indicators of the extent of global integration in this market are provided by the fact that almost 60% (up from 55% in 1989) of daily transactions in this market in 1992 were cross-border transactions. Further, in 1989, 80% of aggregate FX turnover in London was accounted for by foreign banks (39% from North American banks, 16% from non-British European banks and 11% from Japanese banks). The non-local currency business (excluding dollars which are on one side in 83% of transactions) is also expanding rapidly. Overall, almost 50% of gross foreign-exchange transactions worldwide involved non-local currencies.

The Circadian Rhythms of the FX Market

Trading on the global FX market runs on a twenty-four-hour cycle and has its own circadian rhythms.(4) The FX trading week starts at around 9 a.m. on Monday morning in New Zealand (Sunday, 4 p.m. Eastern Standard Time EST), but trading is slow and starts to pick up only as Tokyo comes on line three hours later. Shortly thereafter, FX traders around the world who are carrying any position over the weekend would (or at any rate should) be calling their contacts in Tokyo or Hongkong or Singapore to check on how the Tokyo market has opened and to leave orders (to buy or sell if the price reaches some reservation level). The active trading is largely confined to Asia and Australia through to around 11 p.m. EST when Europe starts to come in. The Americas join in the trading around 7 a.m. EST, when it is 9 p.m. in Tokyo. Trading continues at a lower pace late in the afternoon in the Americas, and the market is practically nonexistent from about 5 p.m. EST to around 7 p.m. EST when Asia starts to wake up again. This pattern of circadian rhythms continues till Friday evening in the Americas at which time, for all practical purposes, the global currency markets close down till Sunday evening when the cycle starts again. Figure 1 charts this daily rhythm of activity worldwide, using data on the hourly numbers of conversations on the Reuters' electronic dealing system for every trading day from January 1992 to November 1993.

What is most interesting about the daily rhythm of the global foreign-exchange market is the clear influence of people, of human beings, in what one would expect to be a purely techno-economic market. The circadian rhythms of the market reflect human circadian rhythms [Halberg 1959; Minors and Waterhouse 1981] and human needs - the need for sleep, the need to eat, and the need perhaps, for a break for traders in Europe between the intense morning trading with Asia and the slightly less intense afternoon trading with the Americas. These human needs could have real economic effects: they affect the volume and liquidity of the market at different hours of the day and are therefore likely to affect the price spreads that are consequently available at different times of the day (as the spread between **bid** and offer prices typically widens when the market is less liquid). These differences in market liquidity could therefore have significant financial consequences, for instance, for a

customer who might need to do a large currency transaction late on Friday afternoon in New York. In the course of my interviews with trading room managers, it also became apparent that the circadian rhythms in market liquidity were sometimes used by traders to influence market prices in certain directions (as a not very large trade late in the afternoon in New York can have a substantial effect on market prices) to their benefit. However, while economic theory might predict that as traders become aware of such possibilities, the market will adjust to eliminate them, the existence of fundamental human circadian rhythms and needs are likely to ensure the continuance of these market rhythms over time. Certainly, a visual analysis of the hourly conversation patterns in the two-year period 1992-1993 showed great stability in the circadian rhythms of the market.

What these results imply is that as long as humans do not evolve into roundthe-clock beings with no circadian rhythms of their own and needing neither rest nor food, the market will probably not be able to function as a truly globally integrated twenty-four-hour market offering the same levels of market efficiency and liquidity throughout the day. The limits of human circadian rhythms also have implications for the individuals who work in increasingly globally integrated industries and in multinational corporations that span multiple time-zones and expect round-the-clock coordination across borders, an area that I will explore in more depth in my discussion of the effects of global market integration on individuals.

(Graph Omitted)

Speculation in the FX Market

Much of the activity in the FX market is speculative. While the foreignexchange market originally grew as a service to corporate customers who needed to buy or sell foreign exchange for their import and export requirements, after the breakdown of the Bretton Woods agreement and fixed exchange rates in the mid-seventies, the door was open to speculation in foreign-exchange and the market saw an explosive growth in volumes [Ohmae 1990].

Total monthly net turnover in the FX market typically ranges from 70 to 140 times average monthly foreign trade in much of the world [BIS 1990]. For the U.S. and Japan (which are outliers on the low side), this factor was 25 and 37 times foreign trade in 1989. As the BIS survey [1990] remarks,
Even in the United States and Japan, . . . the role of commercial transactions in driving foreign exchange business seems to have been relatively modest, although a given commercial transaction may generate a whole chain of foreign-exchange operations. (p. 4).

In the period 1986--1989, while the net average FX turnover in the U.K., U.S. and Japan increased by over 100%, the dollar value of these three countries' foreign trade increased by only around 50%, and the growth in their international banking activity, as measured by cross-border claims in all currencies, was around 70%. This indicates that the growth in speculative currency trading has perhaps been higher than the growth in currency trading on account of 'real' factors like the growth in trade or in cross-border investments. Another indicator that is commonly used to track speculative activity, is the proportion of business conducted on the inter-bank market as compared to the extent of business done with customers (typically corporations seeking to meet their trade needs or fund managers looking for the best currency in which to invest their funds). Dealing with customers can be risk-free for the banks if they instantly reverse the transaction on the market (as a small margin of profit is built into the prices quoted to customers). However, the proportion of customer trading to interbank trading says little about the absolute volumes of speculative activity in the market, as it may take a series of transactions to reverse

the inventory imbalance caused by a single customer trade [Admati and Pfleiderer 1988] - also known in the market microstructure literature in finance as the "hot potato" model of trading [Lyons 1994]. When comparing across units (firms, countries) or across time, though, the proportion of customer trading to total trading can give us a relative picture of the extent to which one firm might be involved in trading on its own account versus trading on behalf of customers, compared to another; or of the changes in speculative activity over time, assuming overall activity patterns remain reasonably stable. While the definition of 'customer' tends to vary from country to country, BIS statistics show that in 1992, 88% of the net turnover in the market was with other banks and only 12% was with non-bank customers. Unfortunately, there is no clear picture of the change in this proportion over the prior three-year period, because of changes in the way BIS accounted for the trades.

However, all of the indicators taken together, (the volumes and the growth in FX trading compared to international trade and banking activity), the fact that many of the 'customers' in the secondary and tertiary networks (corporations, hedge-funds, second-tier banks, private traders, country central banks) themselves buy and sell FX for speculative holding, and finally, my observation of traders at work in major market-making banks worldwide, suggests the existence of substantial speculative activity in this industry. While trading profits may be fair compensation for the valuable role traders play in processing **information** and in assisting in the **price** discovery function in the **market**, deliberate speculation (the taking of positions in anticipation of **price** movements), or 'informed trading by professional traders' is an intrinsic part of this price-discovery function.

An understanding of the extent and nature of activity in this market is important to comprehending the impact of market integration on a state's ability (or for that matter, a regional economic bloc's ability) to exercise some control on its exchange rates and consequently, on economic and monetary policy within its jurisdiction.

THE STATE AND GLOBAL MARKET INTEGRATION: ILLUSIONS OF CONTROL

Black Wednesday

On September 16, 1992, in what has since come to be known as Black Wednesday, despite reportedly massive central bank intervention, the pound sterling dropped to a level that hit its 'floor' price against the German mark in the European Exchange Rate Mechanism (ERM) that specifies a **band** (the 'snake') within which ERM currencies can move. This forced the British government to withdraw the pound sterling from the ERM, at least temporarily derailing progress towards a single currency in Europe. The Italian lira which had been under price pressure all week, also withdrew from the ERM, resulting in a major setback for European monetary union. In the weeks and months that followed, other European currencies came under similar attack in the currency markets.
The case of the Swedish krone is particularly interesting. The Swedish government was committed to obtaining full EC membership for Sweden, and one signal to the EC of Sweden's readiness to join in was the ability of the Swedish krone to stay within a narrow **band** of the German mark, which would indicate both the ability of the Swedish krone to meet the convergence requirements of the ERM, and the commitment of the Swedish government to maintaining economic policies consistent with the rest of the EC. In November 1992, despite raising overnight interest rates to 500% to support the krone, the value of the krone dropped till the government could no longer continue to try to support it. Subsequently, the Swedish government was forced to delink its currency from the ERM, at what was perceived at the time as a blow to Sweden's hopes of early full membership

into the EC, and a challenge to states' control of their own monetary policy.

Some researchers have attributed EMS instability to, among other reasons, 'self fulfilling speculative attacks' by traders who anticipate that a country's monetary policies will be modified as a result of the attack [Eichengreen and Wyplosz 1993]. While it is clear that the immediate cause of the withdrawal from the ERM of the sterling and the lira can be directly attributed to their weakness in the currency markets, the underlying causes are perhaps more complex. Factors that have been cited range from the general misalignment of the underlying economies due in part to the German Bundesbank's reluctance to raise interest rates [Eichengreen and Wyplosz 1993], to politics and miscommunication within the European Union [Norman and Barber 1992], and more generally, to the inconsistent and uncoordinated macroeconomic policies pursued by the different European governments. While the withdrawal of the British pound from the ERM has been called the "most embarrassing and serious reversal in economic policy since the Labour government was forced to call in the IMF in 1976" [Sunday Times, December 6, 1992] for the British government, it is not clear whether the actions of the currency markets in this period hurt or helped the British and other European economies, and this would certainly be a study worth undertaking. While the Treasuries of these countries undoubtedly lost money in the short run while trying to support their currencies (the British government alone is said to have spent over 15 billion to prop up the sterling during this period), the devaluations were probably required, and early evidence seems to indicate that at least the British and the Swedish economies have benefited overall from delinking their currencies from the ERM.

The perceived lack of state control over economic policy that these events pointed towards has brought forward calls from various central bankers and academics [Eichengreen and Wyplosz 1993] to regulate the currency markets, or at least to slow them down with a tax on speculative transactions [Tobin 1994]. Other scholars have recognized that "the volume of activity in international financial markets is so great and its power so strong, that governments cannot realistically expect to impose their wills on it" [Dominguez and Frankel 1993: 1].
How would regulation work in such a globally integrated market? In addressing this issue, I bring a different perspective by describing some experiences of the bank trading rooms that have to comply with regulation, to assess both how global market integration and the multinationality of the firms operating in this industry tend to affect the success or failure of states' attempts at regulation in this market.

Some Experiences of Regulation

Compared to other financial markets (such as the New York Stock Exchange), there is little regulation of the FX market in the developed world. There is no concept of 'insider trading' in this market as it is considered too large to be manipulated, though anecdotes about manipulation abound.(5) Traders can therefore legally trade ahead of a large customer **order**.
The world's central banks monitor banks' FX trading activities to varying extents. Examiners from the Federal Reserve, for instance, periodically check on banks' FX risk positions. The Bank of England (BOE) is reputed to play a more active role in monitoring daily trading. Trading room managers interviewed for this study cited several instances of the BOE's active monitoring. In the case of one major international bank in London, the BOE apparently pointed out the fact that its traders had built up a large uncovered forward exposure that would have to be unwound all at the same time, and in fact assisted the bank in unwinding its position without upsetting the market. In another case, a treasurer recounted his personal experience as a rookie trader in London. Apparently, just before close of trading every evening, a particular customer unloaded a large quantity of

sterling on him, which the trader would promptly sell on the market. After this had been happening for a few days, "the old lady" (BOE) called him up to say that next time, they would be happy to take the position off him at market prices, as his late-in-the-day maneuvers were depressing sterling closing prices. However, both these instances of active monitoring show more of an effort to maintain a watchful eye on the market and 'orderly' sterling price-levels than an attempt to regulate organizational participants in any significant way.

The Ministry of Finance (MOF) and the Bank of Japan (BOJ) attempt to play a more active role in regulating foreign-exchange trading. First of all, only commercial banks designated as 'authorized foreign-exchange banks' can **quote** two-way prices and make markets in foreign-exchange in Tokyo.
This leads to foreign investment banks, for instance, trading in Tokyo only as customers of the commercial banks - the investment banks are not allowed to deal with other customers themselves. However, not being authorized foreignexchange dealers in Tokyo does not prevent foreign investment banks from setting up currency-trading operations in Tokyo, as long as they do not **quote** two-way prices in the local market, and account for transactions as part of their Head Office accounts. Here again, the multinationality of these banks renders these control attempts somewhat meaningless.
The other interesting attempt at regulation by the MOF/BOJ in the Tokyo market concerns the 'limits' on overnight yen positions (they are not concerned about positions in other currencies) that the regulators impose on banks operating in Japan to control speculation in yen. Every evening, the 'closing' yen positions have to be reported to the MOF by banks in Japan, and they have to be within limits specified by the regulators, limits that every banker interviewed in Tokyo complained were much too low. However, the only disruption this causes to trading is that, every afternoon, just before the official closing, each bank's trading-room in Tokyo calculates its yen position and transfers the excess balance through a dummy transaction (which is reversed the first thing the next morning at the same price) to its Singapore or Hongkong office. The responsibility for the overnight position remains that of the Tokyo traders who incurred it. This way, the MOF/BOJ maintain their illusion of control on speculation in yen, in essence denying both the spread of multinational banking and the futility of unilateral regulation attempts to curb speculation in a globally integrated market.

Intervention

Central banks also often intervene in FX markets, sometimes unannounced and sometimes explicitly, to try and maintain price-levels within policyjustified ranges. The empirical evidence on the impact of interventions is mixed, with intervention, whether sterilized or unsterilized, appearing to work best when it is a result of concerted action across countries, pre-announced, and in line with macroeconomic trends and announced policy [Dominguez and Frankel 1993]. Even so, interventions can be costly and may only produce short-term stabilization, given the size of the market. In the market, traders tend to have a sense of the intervention capacity of central banks, going along with the intervention till they think the capacity is nearing exhaustion, and then letting the market take its course. In this, central bank interventions can present significant profit opportunities6 to traders, as they represent a situation in which a short-term trend is known in advance.

Perhaps one way to address the perceived lack of control that states have over the currency market is to coordinate collection and distribution of information on its daily activities, and to make that information widely accessible to researchers and to the public, the way information on stock-trading is available now. The complete lack of public information on

the nature and extent of daily activity in the market, as the trades in the market do not go through a central exchange, is one reason why market actions (for instance, the extent of speculation, the possibility of collusive behavior, the build up of speculative bubbles, etc.) are difficult to identify and monitor. With information more widely available, the need for regulation may decrease, as market participants, observers, and states get the tools and information they need to monitor behavior in the market.

THE INDUSTRY AND GLOBAL MARKET INTEGRATION

As mentioned earlier, a primary network of about 150 major international banks controls most of the market. The top four banks worldwide in 1990 (Citicorp, Barclays, Chemical and NatWest) controlled 18.2% of the market, up from 16.7% in 1989 and 15.4% in 1988.(7) The eight-firm concentration ratio was 28% in 1990, up from 25.2% in 1989. While these figures indicate a very competitive market, the volumes of trading that these market shares imply are huge, though the margins may be slim. Citicorp, for instance, is reported to have had a 6.1% market share in 1988-89 [Euromoney, May 1989], which implies a daily turnover in FX of around 40 billion dollars worldwide. Compared to Citibank's reported gross revenues from FX trading of approximately $2.5 million per trading day in 1988 or $616 million for the year [Citicorp Annual Report 1988], this points to a less than .01% margin on FX trading.

While investment banks initially played only a customer role in the market, over the last few years they have started to become major inter-bank players, trading and taking speculative positions on their own account. This shift has happened with the increasing importance of capital flows over trade in moving the FX market. The traditional relationships of the investment banks with fund-managers looking for the best yields on their investments appear to have propelled investment banks such as Goldman Sachs and Salomon Brothers into Euromoney's top fifty list [May 1991].

Technology and Global Market Integration

In assessing the relationship between global market integration and technology in this industry, it is difficult to determine the direction of causality. One can say that technology, especially the introduction of the first Reuters' monitors showing current indicative prices worldwide in 1973, speeded up the process of global market integration which, however, had already begun with the collapse of the Bretton Woods system of fixed exchange rates.

The trading room where the trader arrives at work may come in different sizes and physical layouts but is remarkably similar across the world in much of its basic technology. In practically every trading room observed around the world, each FX trading desk has some of the same basic equipment - typically two to three monitors, one of which is permanently switched to a feed displaying current market prices, and another, perhaps to an electronic dealing system, the third often displaying an internal accounting information system; one or two keyboards attached to these monitors and a sturdy telephone system with switching capability and pre-programmed touch or button dialing connecting each desk to about 100 banks worldwide. In addition, spot traders usually have a number of 'squawk-boxes' on their desks which are open-voice lines to brokers who deal in their currencies. The broker's quotes 'squawk' through these open-voice lines through the day adding to the general noiselevel on the trading floor. The room as a whole may subscribe to several news feeds, again fairly standard ones whether trading takes place in Boston or in Bahrain.

It is thus not difficult for a trader with some experience to move from one trading room to another in some other part of the world, and almost

instantly start trading. However, the actual international mobility of traders across borders is likely to be influenced by a range of other factors, from restrictions on the employment of non-nationals to social and economic factors, and it would be interesting to undertake a study on the actual extent of labor mobility in this globally integrated market.

Where trading rooms differ in their use of technology is in their internal systems. The extent to which the back offices are integrated with the trading floor so that on a real-time basis, traders have access to their positions and profits; whether traders themselves input deals into the computerized accounting system or write up deal-slips which are batch-entered in the back office; and the extent and frequency of consolidation of global risk-positions, tend to vary across banks. However, these internal technological improvements appear not to make too much difference to a trader's ability to trade (I observed that even in rooms that produced fairly real-time (with a few minutes lag) screen statements of a trader's P&L, traders continued to maintain their own handwritten 'blotters'). Similarly, in almost all of the rooms I visited, even though services supplying charts tracking real-time movements in FX prices were available, traders tended to maintain their own hand-drawn charts. It appears that the act of writing down a deal or tracking a price movement on a sheet of graph paper contributes a certain tacit, even tactile element to traders' knowledge of their positions and price movements, which technology does not quite duplicate.

Further, while the technologies themselves may be global, the social and cultural setting in which technology is introduced can alter its impact and sometimes creates startling local effects. In the Japanese trading room of a major American bank which had instituted the cost-saving system of traders directly entering deals into a terminal as they were done, I found that each trader had an assistant who sat with the trader and entered the deals, while in the New York branch of the same bank, traders entered their own deals.

Another instance of the market, despite its level of global integration and efficiency orientation, being embedded in social networks, is illustrated in the following case concerning the introduction of a new electronic dealing system in a room that was using an older competing dealing system from another manufacturer, and the resistance the new system met with from the traders. The manager of the trading room was very keen to have both systems to reduce dependence on a single supplier. The new system was milliseconds faster in execution than the older system, a major competitive advantage in FX trading where a millisecond delay can mean the difference between a profit and a loss. However, this increased speed came at the expense of a trader being able to 'talk' to the party on the other side of the transaction. In the older system, short messages could be exchanged and the party on the other end did not just 'hit' the trader's **bid** or offer price. This ability to communicate with the counterparty was vital to traders who wanted to know why the other party was buying or selling and which individual they were dealing with. An anonymous trade neither conveyed information of the same quality nor appeared to satisfy the traders' social needs at work. As reported by the manager, "traders don't want it (the new system) as it is scary to deal with an anonymous screen ... they want to know who it is -crack some jokes ...." The idea of the social embeddedness of markets [Geertz 1973] appears to be valid even in this huge competitive electronic market spread over five continents.

All of this is not to say that technology makes no difference to trading. Certainly, the ability to monitor global risk-positions has changed the nature of organizational control in the trading room from micro-control of individual behavior to nonintrusive 'virtual' control, characterized by great authority given to individual traders combined with central

monitoring in the best trading rooms, with possible beneficial effects [Zaheer 1992].

Technology in the trading room is also important in its symbolic value for global integration. A bank with rooms in Tokyo and Singapore displayed its commitment to global integration (or to regional integration, at least) by visually integrating its Tokyo and Singapore offices with a huge TV screen in the corner of each room which showed continuous live action from the other office. This was meant to put traders who talked to each other frequently during the day also in visual contact with each other. While it was not clear that the traders actually looked at the screen to communicate, its presence there did appear to give traders the feeling that both rooms were in fact one large office.

Circadian Rhythms and MNC Competitive Advantage

One possible effect of the circadian rhythms of the currency market is that multinational banks operating in this industry can gain competitive advantage from having branches or subsidiaries spanning the world's major time zones, a potential source of advantage from economies of "diachronic scope". As the action in the currency markets chases the sun from Asia to Europe to the Americas, having a set of subsidiaries to minimally cover each of these areas could provide the multinational bank with information from the currently most active markets, and **order**-execution ability around the clock, both of which could contribute to superior ability to trade. Callier [1986] for instance, argues that such a worldwide presence may enable multinational banks to take speculative positions in the foreign-exchange market without increasing the risk of their portfolio, if they pass their open positions on to their branches in the West.

The concept of competitive advantage from diachronic scope is one that may be useful in a wider range of industries than just financial services, as multinationals use the staggering of waking hours around the world to pass on work to branches in other time-zones. MNCs could use workers at daytime rates and able to perform at the peak of their individual circadian rhythms in other parts of the world, to carry out value-adding activities that can be passed on across time in such a manner - activities that meet the criterion of fungibility across borders, and which are perhaps based on explicit, rather than on tacit knowledge [Nonaka and Takeuchi 1995]. Such shifting of valueadding activities could contribute to greater efficiency, or shortened development and operating cycle times. Examples of such activities that have begun to surface include the manning of telephone hotlines, research on legal briefs, and software development. In information-based industries, the concept of floating rather than fixed locations for value-adding activities is already becoming a reality.

GLOBAL MARKET INTEGRATION AND THE FIRM

In this section, I report the results of a specific empirical study that addresses the question of to what extent and in what areas country-effects still appear on firms in a highly global environment. To understand this question, this study empirically explores the impact of home-country, host-country and global effects on organizational patterns - specifically, on the norms or psychology as represented by the risk-culture of the trading room and on the physiology of the bank's control and incentive systems [Bartlett 1986] in a paired sample of foreign-exchange trading rooms in New York and Tokyo of Western and Japanese banks. In testing for the effects of global market integration, the psychology that is perhaps of greatest interest in this setting is the "riskculture" of these trading rooms which is the socially constructed and shared view of what constitutes "acceptable risk" [Douglas 1985; Zaheer 1992]. The systems or physiology which are tested for the effects of integration are the control and

incentive systems (market, bureaucracy or clan). The formal structures (in terms of the organization chart) of all the foreign-exchange trading rooms in this study tended to be identical, consisting of traders grouped by currency, some customer traders who deal with corporate clients, and a 'back office'. Since global isomorphism was so evident in the 'paper' structure, I decided to focus on the more subtle dimensions of systems and organizational culture in this study.

Each of these normative and system-related factors has been shown in the literature to be susceptible to variations due to national culture and so they present an ideal set of organizational patterns on which to test for the competing pulls of home-country, host-country and the global meta-environment. Douglas [1985] and Douglas and Wildavsky [1982] show how the normative context of "acceptable risk" is a socially constructed phenomenon and tends to vary across national cultures. Hofstede [1980], for instance, found that there was a much greater degree of 'uncertainty avoidance' among managers in the Japanese subsidiaries of an MNC than in the U.S. subsidiaries. Cummings, Harnett and Stevens [1971], Hayashi, Harnett and Cummings [1974] and Tse, Lee, Vertinsky, and Wehrung [1988] also find similar cultural effects on the propensity to take risks. As for the structural context of incentive and control systems, again these tend to be highly culture-bound [Aoki 1988]. Clan control, in particular, was originally used to describe control systems in Japanese organizations in contrast to Western organizations [Ouchi 1981].

The choice of these specific normative and structural factors and the choice of trading rooms of Japanese versus Western banks and New York versus Tokyo was deliberate, to increase the probability of finding country effects in this highly global setting.

The Hypotheses

In the highly turbulent and uncertain environment that foreign-exchange trading rooms face, there will be strong pressures to 'do what the others do' and therefore one can expect 'mimetic isomorphism' [DiMaggio and Powell 1983] in organizational patterns and actions across the "organizational field" of a foreign-exchange trading room. At the same time, this is a highly global industry. The question that arises is: Which set of organizations form the reference group for these trading rooms? Is the reference set composed of trading rooms in the host country, trading rooms sharing the same parentnationality (the home country) or, since foreign-exchange trading is a global activity, does global isomorphism prevail?

The null hypotheses in this context have to be that global isomorphism will prevail on the systems and norms across all trading rooms, and that there will be few home-country or host-country influences. If the null hypotheses cannot be rejected, then one could make the case that 'global isomorphism' probably prevails in global industries. However, there is some support in the literature for the alternate positions of strong home-field and host-field effects. The alternate position that local pressures will be strong can be argued from the fact that the host-country represents the group of trading rooms among which there is likely to be maximum communication and trading interaction. Several recent studies [Rosenzweig and Nohria 1994] have emphasized the importance of this local embeddedness [Granovetter 1985]. The alternate position that home-country pressures will be strong has been argued by Porter [1990] and by Kogut [1992].

Against the null hypothesis of global isomorphism in organizational patterns and practices, I suggest the following hypotheses.

The Culture of the Trading Room. As acceptable risk is considered to be

socially constructed [Douglas 1985] and as the Japanese have been shown to be more uncertainty-avoiding than Westerners [Hofstede 1980; Hayashi, Harnett and Cummings 1974], if global isomorphism does not prevail:

HI: "Acceptable risk" will be lower in trading rooms of Japanese banks than in trading rooms of Western banks.

H2: "Acceptable risk" will be lower in trading rooms in Tokyo than in trading rooms in New York.

The Structure and Systems (Clan, Market and Bureaucratic Control). Clan control has been strongly identified with Japanese organizations [Ouchi 1979, 1981], while market control goes with an emphasis on individual performance, and this style has been associated more with Western than with Japanese organizations [Dore 1983; Aoki 1988]. As a result, if global isomorphism does not prevail, we can expect

H3: Clan control will be higher in trading rooms of Japanese banks than in trading rooms of Western banks.

H4: Clan control will be higher in trading rooms in Tokyo than in trading rooms in New York.

H5: Market control will be lower in trading rooms of Japanese banks than in trading rooms of Western banks.

H6: Market control will be lower in trading rooms in Tokyo than in trading rooms in New York.

Finally, as clan control has been described as a substitute for other forms of control [Ouchi 1979, 1981], one can expect organizations that are high on clan control (the Japanese) to have low market or bureaucratic control. So, if global isomorphism does not prevail,

H7: Bureaucratic control will be lower in trading rooms of Japanese banks than in trading rooms of Western banks.

H8: Bureaucratic control will be lower in trading rooms in Tokyo than in trading rooms in New York.

Research Method

In this project, the presence of country effects on control strategies and riskculture was tested in a sample of twenty-eight foreign-exchange (FX) trading rooms of sixteen banks in New York and in Tokyo (see Table 1). The sixteen banks in the sample were in the top fifty worldwide in the FX market [Euromoney, May 1991] and, except for one, in the top ten in their respective countries.
Two questionnaires were personally administered at each trading room, one for spot and forward FX traders and the other for the heads of FX trading, and these were supplemented with observation of trading and around fifty interviews with treasurers, trading room managers, traders and bankers in major international banks. A total of 198 FX traders (80% of the traders surveyed) responded to the questionnaire. Details of the variables making up the constructs and the reliabilities of the scales (Cronbach's alpha) are given in Appendix 1.

The tests for the presence of country effects on firm-level practices are reported in Table 2. A set of multivariate analyses with the norms and structure as the dependent variables and home-country and the host-country as independent variables gave the same results as reported in the bivariate analyses, with the additional result that in the cases where predicted

country effects were found (i.e. on clan and market control), the home-country effect was stronger than the host-country effect. This reinforces the idea that administrative heritage [Bartlett 1986] carries a lot of weight even in as globally integrated an environment as this one. The results did not change even when controlling for the economic profile of the parent bank. An exploration of the relationship between the distance of some of these organizational practices from local practice and from the practices prevalent in the same firm its home-country is described in Zaheer [1995]. As for the norms that prevail in the trading room, there were no country effects on the risk-culture ("acceptable risk") of the trading rooms. Therefore one cannot reject the null hypothesis that acceptable risk is isomorphic across the global field in this set of foreign-exchange trading rooms of major international banks. Perhaps the constant interaction with trading rooms around the world, as well as the multinationality of many of these banks, creates a situation where individual firm differences in acceptable risk overshadow any country-level differences.

The strongest country effects were visible on the structure/systems dimensions of market and clan control. As for bureaucratic control, country effects were visible but in the opposite direction to that predicted. The Japanese banks were far more bureaucratic than the Western banks, despite their greater clan control. This finding goes counter to the traditional view that clan control acts as a substitute for other forms of control [Ouchi 1979]. In these Japanese banks, bureaucracy and clan seem to go hand in hand. The only bureaucratic dimension on which there was no difference between the Japanese and Western banks was on the dimension of centralization, which was, however, higher across all Tokyo-based trading rooms compared to New York-based rooms. Interestingly, it appears that the extent of global isomorphism of organizational patterns is inversely related to the 'distance' of the pattern in question from the global organization-environment interface. Patterns such as the structure of the trading room (structural commonality across trading rooms was discussed earlier), which is governed by the products traded with other rooms, and risk culture, which manifests itself in behavior at the interface with other trading rooms, exhibit global isomorphism in this highly global industry. On the other hand, patterns and behavior in areas that are more insulated from the global environment (the control strategies) tend to differ between different home countries, and to a lesser extent between host countries.

These results should not come as a surprise to researchers studying multinational organization, as the choice appears to be one of integration/ standardization across subsidiaries of those activities that require it, and particularly where the organization's own administrative heritage gives it a particular competitive advantage [Zaheer 1995], while differentiating those activities where local responsiveness is required, for instance, where local labor markets dictate certain types of compensation systems. The link to local labor markets perhaps remains an important influence as, with very few exceptions, employees in a particular location tended to be nationals of the country of location.

The presence of some local effects in this globally integrated market may be partly explained by the limitations that exist on the global mobility of individuals. These limitations may arise from institutional factors such as regulations governing the employment of non-nationals, from social factors that reduce the utility to individuals of global mobility, or from economic factors such as the high costs of posting expatriates or the absence of required language skills, all of which restrict the free movement of employees worldwide within multinational corporations. Unless some of these factors change significantly, the transnational 'elite' [Kobrin 1994] who are employable across the world may remain a rather small elite.

GLOBAL MARKET INTEGRATION AND THE INDIVIDUAL TRADER

In this section, I describe vignettes from a typical working day of an FX trader in New York and describe both the physical setting of a trader's work and how FX trading is done. This section draws from the interviews and observations that formed the exploratory phase of this study. Parts of it, in particular the descriptions of a trader's off-site work life, draw on conversations with and observation of one key informant at work both on the trading floor and offsite, as the trader worked at home. The description that follows may therefore not be entirely generalizable, though from my other interviews, I did not sense that it is at all atypical. While this section is mainly descriptive and is meant to convey some of the flavor of a trader's work, it also raises some interesting questions on what global market integration means to individuals working in this industry and on the social embeddedness visible in the different networks traders use in their daily trading. It also has implications for other industries in which coordination around the world may become the rule rather than the exception.

Traders' Work

The basic function performed by an FX trader is to buy a currency low and sell high, to make a profit. The trader might short-sell the currency if she expects the price of the currency to fall and buy it back after the price has fallen. Between buying and selling the currency, the trader is exposed (has an uncovered 'open' position) in that currency, and given a certain volatility of that currency, the magnitude of the exposure (open position) determines the extent of risk the trader takes. The FX trader's job, then, is to decide at each point of time what kind of exposure she wants to carry in a particular currency, given all the news about its potential movement and market trends. Having decided whether to be overbought or oversold in that currency, she executes the trades on the market by calling up other banks (either on the phone or on the electronic dealing system) and asking for their bids (the other bank's buying price) and offers (the other bank's selling price). Banks in the primary network that consider themselves market-makers in that currency are obliged to **quote** both **bid** and offer prices when they are called. The trader has to instantly decide whether the price is right given her objectives and either accept the **bid** or offer price or decline to make a deal. She also has to **quote bid** and offer prices to other banks that call her, shading the price just a little to one side of the current market price if she would rather buy or sell.

At any time during the day, if a particular trader has built up a large position which she wants to unwind (whether it is gaining or losing money), she can enlist the assistance of other traders to unload the position in the market. As soon as she signals her need for assistance, all available traders will start calling banks on a pre-set list for quotes on that particular currency. Through such orchestrated teamwork, it is possible to unwind a large (for instance, $100 million) position in a few minutes of frenetic activity in $5 million lots with minimal impact on market prices. The need for this kind of orchestrated activity to deceive the market also provides some scale-based competitive advantage to larger rooms.

While they trade, traders absorb information on whether their bids or offers are being 'hit' (taken), who is doing the hitting, and what this could mean for short-term price movements. This intimate knowledge of the market is tacit and only available to the trader on the spot. Even the manager who watches market prices on the screen and the action in the trading-room does not have the same physical feel for the market. FX trading, therefore represents a case of distributed and tacit knowledge [Nonaka and Takeuchi 1995] where the knowledge to make good decisions resides in the individual trader, and is difficult to make explicit.

Traders also continuously call other traders in their networks to understand market expectations of short-term price trends.

(Table Omitted)
(Table Omitted)

Traders' Networks

Traders tend to have several calling networks for different purposes. The smallest of these is the 'trust' network - a group of colleagues and close trader friends in other banks, often in other parts of the world, who can be trusted not to use information shared with them against the trader. Traders in the 'trust' network are often given the responsibility of calling back at night if prices fall to certain levels, or for executing orders at certain prices (though the latter are usually organizationally restricted to traders in the same bank). Members of a trust network rarely trade with each other, though they may sometimes bail each other out of difficult situations. Within this group, traders usually share information on what they really think about the market. Trust network members are usually individuals the trader has known personally often colleagues whom the trader worked with but who have since moved on to other banks or to other subsidiaries of the same bank. On occasion, an outside trader could become part of a trader's trust network just from their trading relationship. In this industry, such trust relationships tend to be dyadic, and it was not clear from my observations that these dyadic relationships necessarily translated into a global "community" of traders, a subject that would be worth studying, particularly with what appears to be the increasing level of interest in electronic communities in sociology.
The second network, larger and more distant than the first, is the 'market information' network, which the trader is likely to call in the morning and throughout the day as she tries to take a 'view'. This could consist of major traders in other banks, contacts in central banks, and other trading acquaintances. The conversations in this network take on a more 'gaming' quality and information exchange can be motivated and even intentionally deceptive.

A third network is the actual trading network, which includes the 'market information' network and usually consists of twenty to a hundred banks that the trader regularly deals with. The trader may not know all the individuals on the other side of the trades in this network, but usually knows a fair number by name. Again, while in theory a trader could contact any one of between 1000 and 1500 trading rooms that are the most active market-makers, the actual set regularly used averages around thirty counter parties for any particular trading room [Zaheer and Zaheer 1995].

Circadian Rhythms and the Trader

A typical working day for an FX trader in New York starts early. If the trader is carrying any overnight position at all and has left call-back instructions with colleagues or trader friends in the Far East or in Europe, a couple of phone calls at night or at 3 or 4 a.m. in the morning are to be expected. The trader has to be fully alert as these calls come in as some instantaneous buy or sell decisions may need to be taken. If the market has been particularly turbulent, or there is important news breaking, the buzzer on the trader's pocket paging device will buzz loudly so that she can wake up and respond to the news flash. If the news looks really important or her positions appear to be in trouble, the trader might decide to go in to work early, at 5 a.m. perhaps, instead of between 6 and 7 a.m. when most FX traders in New York start work. This continuous twenty-four-hour vigil is not easy. A Japanese trader in Tokyo said, "How long can we stay awake? You know, . . . by midnight, I have to sleep. So the three of us (the three senior traders in his room) take turns watching

the market at night."

While the FX market is completely ready for twenty-four-hour global trading, human beings still have their circadian rhythms, which is perhaps the only factor holding back continuous active twenty-four-hour trading at all centers.

A multinational bank has the potential advantage of passing the responsibility for overnight open currency positions westwards to branches in other parts of the world [Callier 1986]. The reality however, is quite different, with responsibility for positions rarely being passed on in such a manner. One reason perhaps lies in the fact that however global the FX market may be, global integration within the multinational organization, particularly in the structuring of incentives, is far from complete. Perhaps it never will be complete as incentives to motivate performance need to be tied to outcomes for which individuals can be held directly responsible. The principle that appears to be fairly universal in FX trading is that individual traders are responsible roundthe-clock for their individual positions and for the profits and losses they make. This is true in Western banks where this profit responsibility has a monetary impact on a trader’s bonus, and in Japanese banks, where it might only affect a trader’s prestige among colleagues. Another possible impediment to the passing of responsibility for open positions lies in the tacit nature of a traders’ knowledge. Only the trader who has taken a particular currency position knows why she did it, and this knowledge may not be fully articulable. She is therefore also likely to be the best person to decide when and how to close out the position.

Coming back to our trader, early morning is often a time to review the news and the results on any overnight position carried, and to study the charts and the daily economic analysis reports of the bank’s technical and economic analysis groups. If the trader is a strategic trader, it is also a time to think about a ’view’ for the day. At this point, traders will often start calling up other traders in their various networks to understand market expectations of price trends. Morning is also the time when the previous day’s profit and loss accounts for each trader or currency group are circulated. Traders get to know how they are doing compared to their peers in the trading room every single day. They also get to know how they are doing compared to their peers in other trading rooms of their bank around the world, typically once or twice a month.

The pace slows a bit in the afternoon in New York, as Europe goes to sleep. Lunch, except in Tokyo and to a lesser extent, in London, tends to be a quick bite at the trading desk. The Tokyo foreign-exchange market, taking advantage of the fact that Europe was still waking up, used to be officially closed for an hour every day for lunch during which time local brokers were not allowed to **quote**, though sporadic trading with Australia, Hong Kong and Singapore continued. Since 1995, Tokyo no longer has official market opening and closing times. Traders in London will occasionally take a break for lunch as it falls at the tail-end of Asian trading and before the Americas are in full swing (Figure 1). However, trading in London is never really quiet. With their unique position on or close to the Greenwich meridian, trading rooms located in London (and in Western Europe) do possess a source of competitive advantage in their ability to span a portion of both the Asian and American trading time-zones.

In the afternoon, traders have to start planning the end-game. In rooms that have strict overnight limits, traders have to start worrying about staying within the limits some time before the end of the day, as intra-day positions can go as high as five or six times the overnight position limits. This becomes particularly important in the Americas as

late-in-the-day trading can run into illiquid markets and consequent widening price spreads. If there are institutionally set stop-loss limits (that the trader should not make a loss greater then a fixed sum of dollars), the trader might try to circumvent the system by holding back a cushion of profit for a rainy day if he has had a particularly good day, or drawing on the cushion to avoid hitting the stop-loss limit. Such practices usually need the cooperation of a broker [Federal Reserve Bank of New York 1989] or another trader or of the back-office. I was told of instances where such behavior came to light only after the trader had left the organization and in those particular cases, the broker demanded payment.

As the trading day draws to a close, traders in banks that have no positionlimits can take advantage of the fact that if traders in a particular bank that is known to have strict limits have been buying dollars all day long, by the end of the day those traders will have to sell to stay within their limits. In the FX market, knowledge of any such vulnerability is exploited. The only factor that prevents this becoming a daily affair is the fact that traders have no way of knowing the position limits of a trader in another bank, or whether that trader has been buying dollars all day to cover customer orders (in which case he will not need to sell to cover his position) or on his own account. For this reason, customer orders and position limits are among the most closely guarded secrets in the industry.

After our trader leaves work at around 5 p.m. in New York, the market is usually fairly quiet till traders in Tokyo start to come in around 7 p.m. EST. Then the trader's off site work begins. All traders who carry overnight positions typically have some device that they carry with them to stay in touch with the market. Some senior traders may have Reuters' screens in their homes. Then the night calls begin, calls to the 'trust' network in Tokyo, Singapore and Europe to learn how these markets have opened or to leave orders to buy or sell at a certain price and orders to be called if anything important happens. The only time a trader in New York can truly forget about the market is from Friday evening to Sunday afternoon when all FX markets in the world are in effect closed.

What do the circadian rhythms of the global market mean for the managers and workers who have to interface with this market? Such markets create pressure on individuals to be available round-the-clock and make redundant the concept of fixed-length workdays. Increasingly, these pressures are likely to occur not just in patently globally integrated contexts such as currency trading, but in many managerial roles in multinational enterprises that require real-time worldwide coordination or decisionmaking. Several of the treasurers and senior managers who were interviewed in the course of this study would routinely keep odd hours to deal with worldwide conference calls or calls to head offices in other parts of the world. Whether the circadian rhythms of global markets lead to changes in individual circadian rhythms [Halberg 1959] and further, whether these changes have physiological or psychological effects may be a question worth studying. There is certainly much anecdotal evidence of trader "burn-out" which is attributed to the twenty-four-hour responsibilitycycle in this industry.

CONCLUSION

In exploring the currency trading industry at different levels of analysis, I hope to convey some sense of the variety and complexity of issues that arise with global market integration for states, for multinational firms and for individuals who have to interface with the market. In the process, I hope to have made readers aware of the peculiarities and potential for theory-building and research in an unusual industry, which is still one at the leading edge in terms of extent of global market integration, and which might as a result, represent a small window into a future where we can expect increasing market fusion in certain industries.

The findings from this study can be used as a basis for building and testing theory in a variety of disciplines. At the level of analysis of states and the market, for instance, it should be possible to formally model the impossibility of unilateral attempts to control speculation, given both the multinationality of participants in the market and the extent of market integration. At the level of firms in the industry, this setting provides a rich context in which to study the impact of sources of difference in organizational capabilities, particularly of firms coming from different home countries, as all of the participants compete in the same global marketplace. This industry also provides an ideal setting in which to study the role of information and interorganizational networks as sources of competitive advantage. At the firm level and at the individual level, this setting provides an arena in which to build theory and test a range of decisionmaking, risk-taking, and gaming behaviors drawing from a number of perspectives, and to examine the impact of global circadian rhythms on the organization and on the individual. Further, ideas such as the use of circadian rhythms for competitive advantage could be explored in a variety of other industries. Some of the key implications of the ideas explored in this paper are summarized below.

At the level of the state, the futility of traditional unilateral regulation in this market is made amply clear by the experiences of regulation in the trading rooms. A possible solution to monitoring the market might involve a concerted effort to collect information on trading on a more regular basis in this market. While this will require a major effort on the part of an organization like the Bank for International Settlements and cooperation from central banks worldwide, with an increasing proportion of the trading going through electronic media, this task does lie within the realms of possibility. For multinational firms in this industry and in others, the use of the circadian rhythms of global markets as a source of competitive advantage is an idea with potential. The economies of diachronic scope that arise by having branches across global time-zones will perhaps be most influential in informationintensive industries, where value-adding activities are fungible across borders, and for activities that build on explicit rather than on tacit knowledge. Finally, the influence of human circadian rhythms on the circadian rhythms of the market leaps out at us as we examine this industry. What this suggests, as multinational firms attempt to coordinate operations around the world and as markets get more integrated worldwide, is that as we work in these firms and create these markets, our social, psychological and physiological requirements will shape the nature of these global organizations and markets.

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Implied volatility functions: empirical tests.

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Abstract: Derman and Kani (1994), Dupire (1994), and Rubinstein (1994) hypothesize that asset return volatility is a deterministic function of asset price and time, and develop a deterministic volatility function (DVF) option valuation model that has the potential of fitting the observed cross section of option prices exactly. Using S&P 500 options from June 1988 through December 1993, we examine the predictive and hedging performance of the DVF option valuation model and find it is no better than an ad hoc procedure that merely smooths Black-Scholes (1973) implied volatilities across exercise prices and times to expiration. (Reprinted by permission of the publisher.)

Text:

Expected future volatility plays a central role in finance theory. Consequently, accurately estimating this parameter is crucial to meaningful financial decision making. Finance researchers generally rely on the past behavior of asset prices to develop expectations about volatility, documenting movements in volatility as they relate to prior volatility and/or variables in the investors' information set. As useful as such investigations have been, they are by nature backward looking, using past behavior to project forward. An alternative approach, albeit less explored in the literature, is to use reported option prices to infer volatility expectations.(1) Because option value depends critically on expected future volatility, the volatility expectation of market participants can be recovered by inverting the option valuation formula.

The volatility expectation derived from reported option prices depends on the assumptions underlying the option valuation formula. The Black-Scholes (1973) model, for example, assumes the asset price follows geometric Brownian motion with constant volatility. Consequently, all options on the same asset should provide the same implied volatility. In practice, however, Black-Scholes implied volatilities tend to differ across exercise prices and times to expiration.(2) S&P 500 option-implied volatilities, for example, form a "smile" pattern prior to the October 1987 market crash. Options that are deep in the money or out of the money have higher implied volatilities than at-the-money options. After the crash, a "sneer"(3) appears - the implied volatilities decrease monotonically as the exercise price rises relative to the index level, with the rate of decrease increasing for options with shorter time to expiration.

The failure of the Black-Scholes model to describe the structure of reported option prices is thought to arise from its constant volatility assumption.(4) It has been observed that when stock prices go up volatility goes down, and vice versa. Accounting for nonconstant volatility within an option valuation framework, however, is no easy task. With stochastic volatility, option valuation generally requires a market price of risk parameter, which, among other things, is difficult to estimate. An exception occurs when volatility is a deterministic function of asset price and/or time. In this case, option valuation based on the Black-Scholes partial differential equation remains possible, although not by means of the Black-Scholes formula itself. We refer to this special case as the "deterministic volatility function" (DVF) hypothesis.

Derman and Kani (1994a,b), Dupire (1994), and Rubinstein (1994) develop variations of the DVF approach. Their methods attempt to decipher the cross section of option prices and deduce the future behavior of volatility as anticipated by market participants. Rather than positing a structural form for the volatility function, they search for a binomial or trinomial lattice that achieves an exact cross-sectional fit of reported option prices. Rubinstein, for example, uses an "implied binomial tree" whose branches at each node are designed (either by choice of up-and-down increment sizes or probabilities) to reflect the time variation of volatility.

The goal of this paper is to assess the time-series validity of assuming volatility is a deterministic function of asset price and time. We do this by answering the question: Is the asset price behavior revealed by these methods validated by the actual, subsequent behavior of asset prices? We do not perform statistical analysis on the asset prices themselves, however, as this would require years of observations. Instead, we consider the future behavior of option prices. This approach represents a powerful statistical procedure that more rapidly yields a verdict on the validity of the DVF approach.

To implement this approach, we simply move out-of-sample to assess whether the volatility function implied today is the same one embedded in option prices tomorrow. If the estimated volatility function is stable

through time, this finding supports the DVF approach as an important new way to identify the underlying process of financial market prices and for setting hedge ratios and valuing exotic options. On the other hand, if the estimated function is not stable, we must conclude that valuation and risk management using the DVF approach is unreliable and that other explanations for the Black-Scholes implied volatility patterns must be sought.

The paper is organized as follows. In Section I, we document the historical patterns of the Black-Scholes implied volatilities. In Section II, we provide a brief overview of the implied tree approach. Section III outlines our empirical procedure. We show how it is related to the implied tree specification, we review our computational procedure for option valuation under deterministic volatility, and we describe the data. In Section IV, we estimate the implied volatility functions using the DVF model on S&P 500 index option prices, and we describe the model's goodness-of-fit and the time-series behavior of its implied parameter values. In Sections V and VI, we assess the time-series validity of the implied volatility functions. Section V examines how well the implied functions predict option prices one week later, and Section VI assesses whether the DVF approach improves hedging performance. In Section VII, we examine several variations of the model and the procedure to ascertain the robustness of our approach. Section VIII concludes with a summary of the main results and some suggestions for future research.

I. Black-Scholes Implied Volatility Patterns

The motivation for considering deterministic volatility functions in option valuation arises from apparent deficiencies of the Black-Scholes model. These deficiencies are most commonly expressed in cross section as the relation between the Black-Scholes implied volatility and option exercise price. In this section, we illustrate this relation for S&P 500 index options and describe its implications for option valuation.

S&P 500 index options are used in our illustration because, as Rubinstein (1994) argues, this option market provides a context where the Black-Scholes conditions seem most reasonably satisfied. We use only one cross section of option prices, from April 1, 1992, but the pattern on this day is typical of those since the October 1987 stock **market** crash. The **data** for the example include all **bid** and **ask** **price** quotes for call options during the half-hour interval of 2:45 to 3:15 p.m. (CST). To compute the implied volatilities, we use the Black-Scholes call option formula,

c = (S - PVD)N((d.sub.1)) - (Xe.sup.-rT)N((d.sub.2)), (1)

where S - PVD is the index level net of the present value of expected dividends paid over the option's life, X is the option's exercise price, T is the time to expiration, r is the risk-free interest rate, (Sigma) is the volatility rate,

(Mathematical Expression Omitted), (2)

(d.sub.2) = (d.sub.1) - (Sigma) (-square root of T), (3)

and N(d) is the cumulative unit normal density function with upper integral limit d. To proxy for the risk-free rate, the rate on a T-bill of comparable maturity is used. The actual cash dividends paid during the option's life are used to proxy for expected dividends. For each option price, the implied volatility is computed by solving for the volatility rate ((Sigma)) that equates the model price with the observed **bid** or **ask quote**.(5)

Figure 1 illustrates the typical pattern in the S&P 500 implied volatilities. Strikingly, the volatilities do not all lie on a horizontal line. This pattern is often called the volatility "smile" and constitutes evidence against the Black-Scholes model. In the figure, the "smile" actually appears to be more of a "sneer." The smile label arose prior to the 1987 crash when, in general, the volatilities were symmetric around zero moneyness, with in-the-money and out-of-the-money options having higher implied volatilities than at-the-money options. The sneer pattern displayed in Figure 1, however, is more indicative of the pattern since the crash, with call (put) option implied volatilities decreasing monotonically

as the call (put) goes deeper out of the money (in the money).

Figure 1 also illustrates that the sneer is influenced by the time to expiration of the underlying options.(6) The implied volatilities of seventeen-day options are generally lower than the forty-five-day options, which, in turn, are lower than the eighty-day options. This pattern suggests that the local volatility rate modeled within the DVF framework is a function of time.

The differences in implied volatilities across exercise prices shown in Figure 1 appear to be economically significant. The **bid**-implied volatility for the short-term, in-the-money call, for example, exceeds the **ask**-implied volatility for the short-term, at-the-money call,(7) implying the possibility of an arbitrage profit. A strategy of selling in-the-money calls and buying at-the-money calls to capture the "arbitrage profits" is more complex that merely spreading the options, however, and requires dynamic rebalancing through time. The differences among the implied volatilities, however, are too large to be accounted for by the costs of dynamic rebalancing, as can be shown using the Constantinides (1997) bounds.

The differences raise a question concerning the source of the Black-Scholes model's apparent deficiency. One possibility is that the constant volatility assumption is violated, or that the distribution of asset prices at expiration is not lognormal. In this context, the emergence of the volatility sneer after the crash might be explained by an increase in investors' probability assessment of downward moves in the index level. The nonlognormality of prices is also consistent with what has become known as the "Fischer Black effect." Black (1976) writes

I have believed for a long time that stock returns are related to volatility changes. When stocks go up, volatilities seem to go down; and when stocks go down, volatilities seem to go up. (p. 177)

This inverse time-series relation between stock returns and volatility changes has been documented in a number of empirical studies. Most of the studies use stock returns to measure volatility, but the effect is also apparent when volatility is measured using option prices. Figure 2 shows the level of Black-Scholes implied volatility during the sample period of our study, June 1, 1988 through December 31, 1993. As the S&P 500 index level trends up, the level of implied volatility trends down. The correlation in the first differences of these series is -0.570.

In addition to the DVF approach considered in this paper, a number of option valuation models are capable of explaining the behavior documented in Figures 1 and 2. The stochastic volatility models of Heston (1993) and Hull and White (1987), for example, can explain them when the asset price and volatility are negatively correlated. The negative correlation is what produces the sneer, not the stochastic feature itself. Similarly, the jump model of Bates (1996a) can generate these patterns when the mean jump is negative. Deterministic volatility models, however, are the simplest because they preserve the arbitrage argument that underlies the Black-Scholes model. Unlike stochastic volatility and jump models, they do not require additional assumptions about investor preferences for risk or additional securities that can be used to hedge volatility or jump risk. Therefore, only the parameters that govern the volatility process need be estimated.

II. The Implied Tree Approach

The implied tree approach developed by Derman and Kani (1994a,b), Dupire (1994), and Rubinstein (1994) assumes the local volatility rate is a flexible but deterministic function of the asset price and time. The aim of the approach is to develop an asset price lattice that is consistent with a cross section of option prices. The general procedure for doing this involves: (a) estimating the risk-neutral probability distribution of asset prices at the end of the lattice, and (b) determining the up and down step sizes and probabilities throughout the lattice that are consistent with the implied probability distribution.

The implied probability distributions obtained from step (a)

typically seem consistent with the apparent deficiencies of the Black-Scholes model. In particular, for S&P 500 options, the distributions tend to exhibit negative skewness and excess kurtosis relative to the lognormal distribution. The excess kurtosis is a well-known feature of historical stock returns and the skewness is consistent with the notion that after the crash investors increased their assessment of the probability of stock market declines. Indeed, as Rubinstein reports, the implied probability assessment of decreases is so severe that it is "quite common" to observe a bimodal distribution. In other words, for index levels far enough below the mean, the implied probability actually increases.

Step (b) in the approach involves constructing the asset price tree. At any node in the tree, we can deduce the move volatility, which in the limit converges to the local volatility rate, (Sigma)(S, t). The structure of these volatilities is typically consistent with the empirical evidence regarding stock volatility. Specifically, an inverse relation exists between the index level and volatility - as the index falls, volatility increases (Black (1976)). Moreover, the relation is asymmetric - the increase in volatility for decreases in the index tends to be larger than the decrease in volatility for higher index levels (Schwert (1989, 1990)).

The reasonableness of these implied dynamics provides indirect support for the implied tree approach. But, given the many potential applications stemming from this approach, more comprehensive tests seem necessary. The approach yields an estimate of how the asset price evolves over time, and this estimate could be used to value other derivatives on the same asset (e.g., American and exotic options) or as the basis for more exact hedge ratios. Moreover, to the extent that the asset is a stock market index, the estimates could be used in more general asset pricing and volatility estimation contexts. The reliability of the approach in these settings depends critically on how well we can estimate the dynamics of the underlying asset price from a cross section of option prices. This assessment is the purpose of this paper.

III. Empirical Methodology

In this section, we begin by describing the intuition for our valuation method vis-a-vis the implied tree approach. As in the implied tree approach, our method assumes the local volatility rate is a deterministic function of asset price and time. Next we provide a formal description of the deterministic volatility function valuation framework, and we specify the structure of the volatility functions that we test in our analysis. The final subsection describes the data.

A. Intuition

The implied tree approach uses a cross section of option prices to imply the tree (and, hence, to implicitly estimate the volatility function) that achieves an exact fit of observed option prices. An exact fit is possible because there are as many degrees of freedom in defining the tree as there are observed option prices. With so much freedom in parameter selection, however, the possibility exists that the approach overfits the data.

We examine this possibility by evaluating the time-series reliability of the implied parameter estimates. The logic of our test is straightforward. First, we use today's option prices to estimate the parameters of the underlying process, that is, the implied tree. Then, we step forward in time. If the original tree was correct, then the subtree stemming out of the node realized today must again be correct. Equivalently, option values from this subtree (using the new asset price) should be correct. If, however, the volatility function is not stable through time, then the out-of-sample option values are inaccurate. This finding suggests that the cross-sectional fit has not identified the true volatility function or the true stochastic process for the underlying asset.

Using a tree-based approach to implement this test suffers from a practical limitation. Suppose we estimate an implied tree today, and then step forward in time to use the remainder of the tree. The likelihood that

the realized asset price falls exactly on a node of our original tree is remote. Indeed, the realized price is virtually certain to fall between nodes or entirely outside the span of the tree. Consequently, using the tree for out-of-sample option valuation would require interpolation or extrapolation techniques.

To avoid this complication, we specify from the start an interpolative functional form for the volatility process. We consider a number of alternatives based on a Taylor series approximation in S and t. Once we specify the function, we can estimate its parameters by obtaining the best fit of the option values under deterministic volatility with the observed option prices. This deterministic volatility function (DVF) approach to fitting the data is slightly different from the implied tree approach, but the spirit of the two approaches is the same. Both fundamentally concern obtaining estimates of the deterministic volatility function. What we will show is that, even with fairly parsimonious models of the volatility process, we achieve an "almost exact" fit of observed option prices. The crucial question, then, concerns the stability of these estimates over time. Using more elaborate models such as those embedded in the lattice-based approaches presents an even greater danger of overfitting reported prices and deteriorating the quality of prediction.

The fact that we allow for pricing errors in our approach may seem inconsistent with the implied tree approach. Rubinstein requires that all option values computed using the implied tree fall within their respective **bid** and **ask** prices observed in the market - that is, that no arbitrage opportunities exist. More recent research, however, relaxes this requirement. Jackwerth and Rubinstein (1996), for example, advocate using **bid**/**ask** midpoint prices, as we do, rather than the **bid** /**ask band** due to the tendency to "(overfit) the data by following all the small wiggles" when the no-arbitrage constraint is imposed. As a result, they allow for "small" deviations from market prices, and use the sum of squared dollar errors (as we do also) in their objective function in fitting the implied tree.

B. Option Valuation under Deterministic Volatility

Option valuation when the local volatility rate is a deterministic function of asset price and time is straightforward. In this case, the partial differential equation describing the option price dynamics is the familiar Black-Scholes (1973) equation,

-1/2 ((Sigma).sup.2) (F, t) (F.sup.2) ((Delta).sup.2)c/(Delta)(F.sup.2) = (Delta)c/(Delta)t, (4)

where F is the forward asset price for delivery on the expiration date of the option, c is the forward option price, (Sigma)(F, t) is the local volatility of the price F, and t is current time.(8) We use forward prices, rather than spot prices, for both the option and the underlying asset to avoid the issue of randomly fluctuating interest rates.

Equation (4) is called the backward equation of the Black-Scholes model (expressed in terms of forward prices). The call option value is a function of F and t for a fixed exercise price X and date of expiration T. At time t when F is known, however, the cross section of option prices (with different exercise prices and expiration dates) can also be considered to be functionally related to X and T. For European-style options, Breeden and Litzenberger (1978) and Dupire (1994) show that the forward option value, c(X,T), must be a solution of the forward partial differential equation,(9)

1/2 ((Sigma).sup.2) (X, T)(X.sub.2) ((Delta).sup.2)c/(Delta)(X.sup.2) = (Delta)c/(Delta)T, (5)

with the associated initial condition, c(X,0) = max(F - X, 0). The volatility function in equation (5) is the same one as in equation (4), but the arguments, F and t, are replaced by X and T. Equation (4) requires the local volatility that prevails at the present time when the date is t and the index level is F; equation (5) uses the future local volatility that will prevail on the expiration date, T, when the underlying index is then at level X.

The advantage of using the forward equation to value European-style options (such as those on the S&P 500 index) is that all option series with a common time to expiration can be valued simultaneously - a considerable computational cost saving when using numerical procedures.(10) To infer volatility functions from American-style option prices, however, requires solving the backward equation (4) for each option series.

C. Specifying the Volatility Function

We estimate the volatility function, (Sigma)(X,T), by fitting the DVF option valuation model to reported option prices at time t. Because (Sigma)(X,T) is an arbitrary function, we posit a number of different structural forms including:

Model 0: (Sigma) = max(0.01,(a.sub.0)); (6)

Model 1: (Sigma) = max(0.01,(a.sub.0) + (a.sub.1)X + (a.sub.2)(X.sup.2)); (7)

Model 2: (Sigma) = max(0.01,(a.sub.0) + (a.sub.1)X + (a.sub.2)(X.sup.2) + (a.sub.3)T + (a.sub.5)XT); and (8)

Model 3: (Sigma) = max(0.01,(a.sub.0) + (a.sub.1)X + (a.sub.2)(X.sup.2) + (a.sub.3)T + (a.sub.4)(T.sup.2) + (a.sub.5)XT). (9)

Model 0 is the volatility function of the Black-Scholes constant volatility model. Model 1 attempts to capture variation in volatility attributable to asset price, and Models 2 and 3 capture additional variation attributable to time. A minimum value of the local volatility rate is imposed to prevent negative values.

We choose quadratic forms for the volatility function, in part because the Black-Scholes implied volatilities for S&P 500 options tend to have a parabolic shape. The volatility function could also be estimated using more flexible nonparametric methods such as kernel regressions(11) or splines. As noted above, however, we want to avoid overparameterization. In Section VII below, we verify that the quadratic form of the DVF, despite the parabolic branches, leads to robust empirical results.

D. Data Selection

Our sample contains reported prices of S&P 500 index options traded on the Chicago Board Options Exchange (CBOE) over the period June 1988 through December 1993.(12) S&P 500 options are European-style and expire on the third Friday of the contract month. Originally, these options expired only at the market close and were denoted by the ticker symbol SPX. In June 1987, when the Chicago Mercantile Exchange (CME) changed its S&P 500 futures expiration from the close to the open, the CBOE introduced a second set of options with the ticker symbol NSX that expired at the open. Over time, the trading volume of this "open-expiry" series grew to surpass that of the "close-expiry" series, and on August 24, 1992, the CBOE reversed the ticker symbols of the two series. Our sample contains SPX options throughout: close-expiry until August 24, 1992, and open-expiry thereafter. During the first subperiod, the option's time to expiration is measured as the number of calendar days between the trade date and the expiration date; during the second, we use the number of calendar days remaining less one.

As we noted earlier, we estimate each of the volatility functions once each week during the sample. We use Wednesdays for these estimations because fewer holidays fall on a Wednesday than on any other trading day. When a particular Wednesday is a holiday, we use the immediately preceding trading day.

To estimate the volatility functions, we express both the index level and option price as forward prices. Constructing the forward index level requires the term structure of default-free interest rates and the daily cash dividends on the index portfolio. We proxy for the riskless interest rate by using the T-bill rates implied by the average of the **bid** and **ask** discounts reported in the Wall Street Journal. The ti-period interest rate is obtained by interpolating the rates for the two T-bills whose maturities straddle ti. The daily cash dividends for the S&P 500 index portfolio are collected from the S&P 500 Information Bulletin. To compute the present value of the dividends paid during the option's life,

PVD, the daily dividends are discounted at the rates corresponding to the ex-dividend dates and summed over the life of the option; that is,

PVD = (summation of) (D.sub.i)(e.sup.-(r.sub.i)(t.sub.i)) where i = 1 to n, (10)

where (D.sub.i) is the ith cash dividend payment, (t.sub.i) is the time to ex-dividend from the current date, (r.sub.i) is the (t.sub.i)-period riskless interest rate, and n is the number of dividend payments during the option's life.(13) The implied forward price of the S&P 500 index is therefore

F = (S - PVD)(e.sup.rT), (11)

where S is the reported index level and T is the time to expiration of the option. To create a forward option price, we multiply the average of the option's **bid** and **ask** price quotes(14) by the interest accumulation factor appropriate to the option's expiration, (e.sup.rT).

Three exclusionary criteria are applied to the data. First, we eliminate options with fewer than six or more than one hundred days to expiration. The shorter-term options have relatively small time premiums, hence the estimation of volatility is extremely sensitive to nonsynchronous option prices and other possible measurement errors. The longer-term options, on the other hand, are unnecessary because our objective is only to determine whether the volatility function remains valid over a span of one week. Including these options would simply deteriorate the cross-sectional fit.

Second, we eliminate options whose absolute "moneyness," (absolute value of X/F - 1), is greater than 10 percent. Like extremely short-term options, deep in- and out-of-the-money options have small time premiums and hence contain little information about the volatility function. Moreover, these options are not actively traded, and price quotes are generally not supported by actual trades.

Finally, we only use those options with **bid**/**ask** price quotes during the last half hour of trading (2:45 to 3:15 p.m. (CST)). Fearing imperfect synchronization with the option market,(15) we do not use the reported S&P 500 index level or the S&P 500 futures price(16) in our estimation. Instead, we infer the current index level simultaneously,(17) together with the parameters of the volatility function, from the cross section of option prices. In this way, our empirical procedure relies only on observations from a single market, with no auxiliary assumption of market integration.(18) The procedure, however, requires that the option prices are reasonably synchronous - hence the need for a tight time window. The cost of this criterion is a reduction in the number of option quotes, but the cost is not too onerous because we have quotes for an average of 44 (and a range from 14 to 87) option series during the last half-hour each Wednesday.(19) Seventeen of the 292 Wednesday cross sections had only one contract expiration available; 141 had two; 129 had three; and 5 had four.

IV. Estimation Results

Using the S&P 500 index option data described in the previous section, we now estimate the four volatility functions specified in equations (6) through (9). As noted earlier, Model 0 is the Black-Scholes constant volatility model. Model 1 allows the volatility rate to vary with the index level but not with time. Models 2 and 3 attempt to capture additional variation due to time. A fifth volatility function, denoted Model S, is also estimated. Model S switches among the volatility functions given by Models 1, 2, and 3, depending on whether the number of different option expiration dates in a given cross section is one, two, or three, respectively. Model S is introduced because some cross sections have fewer expiration dates available, undermining our ability to estimate precisely the relation between the local volatility rate and time.

This section focuses on identifying the "best" volatility function given the structure of S&P 500 index option prices. First, each local volatility function is estimated by minimizing the sum of squared dollar errors between the reported option prices and their DVF model values.

Summary statistics on the goodness-of-fit and on coefficient stability are provided. Next, we illustrate the shape of the implied probability functions for options of different times to expiration.

A. Goodness-of-Fit

To assess the quality of the fitted models, five measurements are made each week. These are defined as follows:

(i) The root mean squared valuation error (RMSVE) is the square root of the average squared deviations of the reported option prices from the model's theoretical values.

(ii) The mean outside error (MOE) is the average valuation error outside the **bid**/**ask** spread. If the theoretical value is below (exceeds) the option's **bid** (**ask**) price, the error is defined as the difference between the theoretical value and the **bid** (**ask**) price, and, if the theoretical value is within the spread, the error is set equal to zero. A positive value of MOE, therefore, means that the model value is too high on average, and a negative value means the model value is too low. This measure is used primarily to detect biases in specific option categories.

(iii) The average absolute error (MAE) is the average absolute valuation error outside the **bid**/**ask** spread. This measure illustrates the exactness with which each model fits within the quoted **bid** and **ask** prices over all option categories.

(iv) The frequency (FREQ) indicates the proportion of observations where the specified model has a lower RMSVE than Model S.

(v) Finally, the Akaike (1973) Information Criterion (AIC) is calculated to appraise the potential degree of overfitting. The AIC penalizes the goodness-of-fit as more degrees of freedom are added to the model in a manner similar to an adjusted (R.sup.2). The lowest value of the AIC identifies the "best" model based on in-sample performance. Of course, overfitting is best detected by going out of sample (see Section V).

Table I contains the average RMSVEs, MOEs, and MAEs across the 292 days (one day each week) during the sample period of June 1988 through December 1993. The average RMSVE results show a strong relationship between the local volatility rate and the asset price. Where the volatility rate is a quadratic function of asset price (Model 1), the average RMSVE of the DVF model is less than one-half that of the Black-Scholes constant volatility model (Model 0), 30.1 cents versus 65.0 cents, for all options in the sample. Time variation also appears important. In moving from Model 1 to Model 2, the average RMSVE in the full sample is reduced even more (from 30.1 cents to 23.0 cents), albeit not so dramatically. The addition of the time variable to the volatility function appears to be important, although most of the incremental explanatory power appears to come from the cross-product term, XT.(20) Adding a quadratic time to expiration term (Model 3) reduces the average RMSVE to its lowest level of the assumed specifications, 22.6 cents. Model S's RMSVE is virtually the same. The average MOE and MAE measurement criteria lead to the same conclusions for the overall sample. The MAE shows that with Model 3 an essentially exact fit, within the **bid-ask** spread, has been achieved because the average absolute error outside the spread is a mere 5 cents.

Once goodness-of-fit is adjusted to account for the number of parameters in the volatility function, more parsimonious volatility functions appear to work best. The AIC results are reported in Table I as the proportion of days during the sample period that a particular model is judged the best specification. The results indicate that Model 2 provides the best fit of the cross section of S&P 500 index option prices, having the lowest AIC in 67.1 percent of the 292 days in the sample. The next best performer is Model 1, which is even more parsimonious than Model 2 and does not have time variation in the local volatility rate function, outperforming the other models in 25.7 percent of the days in the sample. The more elaborate Model 3, which had the lowest RMSVE, does not perform well once the penalty for the additional variables is imposed - performing best in less that 7 percent of the days in the sample. All in all, the

results indicate that the deterministic volatility function need not be very elaborate to describe the observed structure of index option prices accurately.

The MOE values reported for the Black-Scholes model (Model 0) show that the theoretical value exceeds the **ask** price on average for call options, 16.6 cents, and is below the **bid** price for put options, -23.9 cents. This behavior arises from the character of our sample (i.e., the number of calls versus the number of puts, and the number of in-the-money options versus the number of out-of-the-money options). When the options are stratified by option type and moneyness, the Black-Scholes model value appears to be too low (relative to the **bid** price) for in-the-money calls and for out-of-the-money puts. This is consistent with the implied volatility sneer shown in Figure 1. With all options forced to have the same volatility in the estimation of Model 0, the variation in implied volatility translates into valuation errors. Options with Black-Scholes implied volatilities higher (lower) than average are valued too low (high).

Figure 3 shows the dollar valuation errors (i.e., the model values less the **bid**/**ask** midpoints) of Model 0 for the subsample of call options with 40 to 70 days to expiration. Also shown are normalized **bid**/**ask** spreads (i.e., the **bid**/**ask** prices less the **bid**/**ask** midpoint). Note first that the **bid**/ **ask** spreads are as high as one dollar for deep in-the-money calls on the left of the figure. As we move right along the horizontal axis, the maximum **bid**/**ask** spread stays at a dollar until the moneyness variable is about -2.5 percent, and then the maximum spread begins to decrease as the calls move further out-of-the-money. This spread behavior is consistent with the CBOE's maximum spread rules described earlier. The average **bid**/**ask** spread across all option series used in our estimation is approximately 47 cents.

Figure 4 shows the valuation errors of Model 3 for calls with 40 to 70 days to expiration. The DVF model improves the cross-sectional fit. Where the valuation errors are outside the **bid**/**ask** spread, they appear randomly, with (TABULAR DATA FOR TABLE I OMITTED) a slight tendency for the DVF model to undervalue deep in-the-money and deep out-of-the-money calls and to overvalue at-the-money calls. Overall, however, Model 3's fit appears quite good. The MOE across all calls in this category is just -2.6 cents, in contrast to an MOE of more than 25 cents for the Black-Scholes model.

Model 3 also appears to eliminate the relation between valuation error and the option's days to expiration. For the Black-Scholes model, the valuation errors generally increase with days to expiration. For deep in-the-money calls with fewer than 40 days to expiration, for example, the RMSVE is 31.3 cents; it is 64.4 cents for calls between 40 and 70 days to expiration; and 105.1 cents for calls with more than 70 days to expiration. For the same call options, the RMSVEs for Model 3 are 25.9, 22.1, and 22.0 cents, respectively.

The results in Table I support the notion that a relatively parsimonious model can accurately describe the observed structure of S&P 500 index option prices.(21) The implied tree approach can achieve an exact fit of option prices by permitting as many degrees of freedom as there are option prices. Our results suggest that such a complete parameterization may be undesirable. based on the AIC, Model 2 does "best," with the local volatility rate being a function of X, (X.sup.2), T, and XT. Moreover, where Model 2 does not perform best, the more parsimonious Model 1, with local volatility being only a function of X and (X.sup.2), usually does best. Together, these two simple models outperform the others in 92.8 percent of the 292 cross sections of index option prices examined. based on these in- sample results, parsimony in the specification of the volatility function appears to be warranted.

B. Average Parameter Estimates and Parameter Stability over Time

The average parameters estimated for each of the volatility functions

are also informative. Model 0 is, of course, the constant volatility model of Black-Scholes. When this model is fitted each week during our 292-week sample period, the mean estimated coefficient, (Mathematical Expression Omitted), is 15.72 percent. Recall that Figure 2 shows the level of the Black-Scholes implied volatility on a week-by-week basis. Over the sample period, implied market volatility fell from more than 20 percent to less than 10 percent. Volatility reached a maximum of 27.16 percent on January 16, 1991, the height of the Gulf War. The minimum implied volatility, 9.43 percent, occurred on December 29, 1993, the last date of the sample period.

Model 3 has six parameters, and the averages (standard deviations) of the model's six parameter estimates across the 292 cross sections are reported in Panel A of Table II. The standard deviation of the parameter estimates indicates that there is considerable variation in the coefficient estimates from week to week, implying perhaps that the volatility function is not stable through time. If the parameter estimates are highly correlated, however, the errors affecting them may cancel out when option prices are looked at. To check this possibility, we compute the correlation among the parameter estimates across the 292 weeks in the sample period and report them in Panel B of Table II. As the values show, the correlations are generally quite large. The correlation between the linear and quadratic terms in Model 3, for example, is -0.969, indicating that in weeks where (a.sub.1) is high, (a.sub.2) is low and vice versa.

Table II

Summary Statistics of Parameter Estimates Obtained for Deterministic Volatility Function (DVF) Model 3

Below are summary statistics from fitting Model 3 to the cross-section of S&P 500 index option prices each week during the sample period from June 1988 through December 1993. Model 3 specifies that the local volatility rate is linear in X, (X.sup.2), T, (T.sup.2), and XT, and where X is the option's exercise price and T is its time to expiration. The parameter estimates, (a.sub.1), (a.sub.2), (a.sub.3), (a.sub.4), and (a.sub.5), are the estimated coefficients of each of these terms, respectively. The parameter estimate, (a.sub.0), is the estimated intercept term.

Panel A: Means and Standard Deviations

Coefficient Estimate	Mean	Standard Deviation
(a.sub.0)	131.8	69.5
(a.sub.1)	-0.3529	0.447
(a.sub.2)	0.00008611	0.00768
(a.sub.3)	-0.2260	1.94
(a.sub.4)	-0.0001666	0.00237
(a.sub.5)	0.05275	0.0593

Panel B. Correlations

Coefficient Estimate	(a.sub.2)	(a.sub.3)	(a.sub.4)	(a.sub.5)
(a.sub.1)	-0.969	0.596	-0.811	-0.291
(a.sub.2)		-0.589	0.853	0.182
(a.sub.3)			-0.114	-0.232
(a.sub.4)				0.093

In **order** to examine explicitly the issue of coefficient stability, Figure 5 has four panels containing plots of the time-series estimates of the Black-Scholes implied volatility (i.e., (Mathematical Expression Omitted) in Model 0) as well as of the time-series estimates of

the three main coefficients of Model 3 (i.e., (Mathematical Expression Omitted)). The figures in Panels A and B indicate that the intercept coefficient of the DVF function fluctuates largely in unison with the Black-Scholes implied volatility. Week after week, the coefficient appears to simply record the movements in the level of the volatility. It is to be suspected that, were the coefficients kept constant from one week to the next, very little of the volatility movement would be captured by the movement in the level of the index itself. The plots in Figure 5 themselves are is not entirely meaningful, however, since the movements in the individual coefficients are highly correlated, and they may, to some extent, offset each other when combined to generate fitted volatility levels. We are ultimately interested in the movements of the fitted volatility in the neighborhood of the money.

To examine this further, Figure 6 shows the time series of the explained at-the-money volatility of each week (with contemporaneous coefficients) minus the explained at-the-money volatility of the same week calculated on the basis of the previous week's coefficients. The figure, therefore, portrays the week-to-week changes in the level of the DVF function at the money which result from changes in the coefficients, and which remain "unexplained" by the DVF function and index level changes. It is apparent that these unexplained weekly changes in (annualized) volatility are very large and routinely reach several percentage points.

This evidence indicates that the in-sample estimates for the DVF model seem to be unstable. This inference implies that changes in the coefficient estimates may not be entirely due to economic factors, but may be the result of overfitting. Therefore, it seems critical that we should measure the economic significance of the DVF model in terms of valuation prediction errors. This is exactly the procedure applied in Section V.

C. Implied Probability Distribution

The estimated coefficients of the volatility functions can also be used to deduce the shape of the risk-neutral probability distribution at the option expiration dates.(22) To illustrate, we first use the estimated coefficients of Model 3 on April 1, 1992. On April 1, 1992, the S&P 500 options had three different expiration months, April, May, and June 1992, with 17, 45, and 80 days to expiration, respectively. based on these expirations, the estimated volatility function implies the three probability distributions shown in Figure 7. All distributions are skewed to the left, exactly the opposite of the right-skewness implied by the Black-Scholes assumption of lognormally distributed asset prices. The wider variances for the May and then June expirations merely reflect the greater probability of large price moves over a longer period of time. Our implied distributions do not exhibit the bimodality that was present in Rubinstein (1994). This likely results from the fact that our volatility functions are more parsimonious than those implicitly used within his binomial lattice framework.

V. Prediction Results

The estimation results reported in the last section indicate that the volatility function embedded in index option prices is not particularly elaborate. The AIC indicates that only linear and quadratic terms in asset price are necessary and only linear terms in time. A critical assumption of the model, however, is that the volatility function is stable through time, an assumption we already have reason to doubt. In this section, we evaluate how well each week's estimated volatility function values the same options one week later.

A. Goodness-of-Fit

Table III provides the summary statistics for the prediction errors. The RMSVE, MOE, and MAE values in the table are computed in the same manner as in the previous section. The prediction errors are generally quite large, at least relative to the estimation errors reported in Table I. The average RMSVE reported in Panel A is about 56 cents out-of-sample across all days for all DVF models except Model 0, and the in-sample error for these models is about 23 cents. The MAE statistics tell essentially the

same story but more dramatically: The almost exact fit achieved for Model 3 (i.e., a 5-cent MAE in sample) has deteriorated to nearly 30 cents within a week. New market information induces a shift in the level of overall market volatility from week to week.

The prediction errors for calls and puts reported in Panel A are about the same size. As in the case of the estimation errors, the average MOE for Model 0 is positive for calls and negative for puts, depending on the character of the sample. When the options are stratified by option type and moneyness, we see that the Black-Scholes model value is too low (relative to the **bid** price) for in-the-money calls and out-of-the-money puts and is too high (relative to the **ask** price) for out-of-the-money calls and in-the-money puts. This pattern is particularly clear in Figure 8, which is the analogue of Figure 3, but for the prediction stage.

(TABULAR DATA FOR TABLE III OMITTED)

Interestingly, the average MOE is smaller for Model i than for Models 2, 3, and S. This suggests that the time variable in the more elaborate volatility functions is unnecessary. Apparently, the time variable serves only to overfit the data at the estimation stage. The fact that the valuation prediction errors for the models that include the time variable are more negative than those of Model 1 indicates that the implied volatility functions predict a larger decrease in volatility over the week than actually transpires.

At-the-money options have the largest valuation prediction errors for all times to expiration. This arises because at-the-money options are the most sensitive to volatility (where time premium is the highest). For a given error in the estimated volatility rate, the dollar valuation error is larger for at-the-money options than for either in-the-money or out-of-the-money options. Figure 9, which is the analogue of Figure 4, illustrates that the prediction errors of Model 4 do not display the characteristic patterns across the spectrum of moneyness that we identify above for Model 0.

B. An "Ad Hoc" Strawman

A troubling aspect of the analysis thus far is that, although the RMSVEs seem large for all practical purposes, we have not yet indicated what size of prediction error should be considered "large." One way to gauge the prediction errors is to measure them against a benchmark. To account for the sneer patterns in Black-Scholes implied volatilities, many marketmakers simply smooth the implied volatility relation across exercise prices (and days to expiration) and then value options using the smoothed relation. To operationalize this practice, we fit the Black-Scholes model to the reported structure of option prices each week using Model S to describe the Black-Scholes implied volatility. Obviously, applying the Black-Scholes formula in this context is internally inconsistent because the Black-Scholes formula is based on an assumption of constant volatility. Nonetheless, the procedure is a variation of what is applied in practice as a means of predicting option prices.(23) The DVF option valuation model, which is based on an internally consistent specification, should dominate this "ad hoc" approach.

To create our strawman, we use a two-step procedure similar to the one we used for the DVF models. On day t, we fit Model S to the Black-Scholes implied volatilities, and then, on day t + 7, we apply the Black-Scholes formula using the volatility levels from estimated regression. The valuation prediction errors computed in this fashion are also included in Table III. As the table shows, the errors using the ad hoc model (AH) are almost uniformly smaller than those of the DVF approach. The average RMSVE across the entire sample period is 49.8 cents for the ad hoc Black-Scholes procedure, whereas it is more than 55 cents for the best DVF option valuation model. The average MAE is 23 cents for the ad hoc Black-Scholes procedure and 28.5 cents for Model 1. In viewing the various option categories, the greatest pricing improvement appears to be for at-the-money options, whose average RMSVEs are reduced by 10 cents or more.

Put simply, the deterministic volatility approach does not appear to be an improvement over the, albeit theoretically inconsistent, ad hoc procedure used in practice. One possible interpretation of this evidence is that there is little economic meaning to the deterministic volatility function implied by option prices.

The reason the ad hoc strawman performs marginally better than the DVF model can be seen by examination of Figure 10, which is identical in its format to Figure 6; that is, we show the time series of the explained at-the-money-implied volatility of each week (with contemporaneous coefficients) minus the explained at-the-money implied volatility of the same week calculated on the basis of the previous week's coefficients. A comparison of Figure 10 with Figure 6 shows that the coefficients of the ad hoc model are somewhat more stable than those of the DVF Model 3.

C. A t-Test of Equivalence between the Various Models(24)

Panel A of Table III also reports the results of statistical tests of the equivalence between models. The tests are based on West (1996), and, for ease of reference, we use his notation. Let (f.sub.t) be the (6 x 1) vector of root mean squared prediction errors at time t corresponding to the six models 0, 1, 2, 3, S, and AH. Let Ef be the population value, and let f be the sample average. Then, if we know the population values for all the parameters, f - Ef is asymptotically normal with the variance-covariance matrix:

(Mathematical Expression Omitted). (12)

On the basis of this observation and a generalized method of moments reasoning, we determine (Mathematical Expression Omitted), a 6 x 1 constant vector, such that

(Mathematical Expression Omitted), (13)

where (Omega) is the Newey-West heteroskedasticity-consistent, 6 x 6 variance-covariance matrix with fifteen weekly lags which accounts for the possibility of correlation across the models and serially correlated errors. In this way, we obtain asymptotic t-ratios for the root mean square prediction errors of our six models. Panel A of Table III reports both the incremental root mean squared prediction errors of each model compared to the previous one in the list as well as their corresponding t-ratios.

The test results reported in Table III indicate that DVF Model 1 is a significant improvement over the straight Black-Scholes Model 0. The incremental average root mean squared error is -22.7 cents and its t-ratio is -7.26. The incremental improvements in going from DVF Models 1 to 2, 2 to 3, and 3 to S, however, are insignificant. Finally, the ad hoc model is an improvement over the Model S. The incremental average root mean squared error is -5.7 cents and its t-ratio is -2.46.(25)

VI. Hedging Results

A key motivation for developing the DVF option valuation model is to provide better risk management. If volatility is a deterministic function of asset price and time, then setting hedge ratios based on the DVF option valuation model should present an improvement over the constant volatility model. In this section, we evaluate the performance of a hedge portfolio formed on day t and unwound one week later. Galai (1983) shows that the return on such a discretely adjusted option hedge portfolio has three components: (a) the riskless return on investment, (b) the return from the discrete adjustment of the hedge, and (c) the return from the change in the deviation of the actual option price from the change in the theoretical value.

Since all option prices used in our analysis are forward prices, the riskless return component of the hedge portfolio is zero. Furthermore, because our focus is on model performance and not on the issues raised by discrete-time readjustment, we assume that the hedge portfolio is continuously rebalanced through time. Consequently, the hedge portfolio error is defined as:

((Epsilon).sub.t) = (Delta)(c.sub.actual,t) - (Delta)(c.sub.model,t), (14)

where (Delta)(c.sub.actual,t) is the change in the reported option

price from day t until day t + 7 and (Delta)(c.sub.model,t) is the change in the model's theoretical value.

The proof of equation (14) is straightforward. The hedging error that results from the continuous rebalancing using the hedge ratio, h, is

(Delta)(c.sub.actual,t) - (integral of) h((S.sub.u), u)d(S.sub.u) bet. limits t to t+7. (15)

If we had the correct model to determine h, the two quantities in equation (15) would be equal to one another, not as a real number equality but with probability one or at the very least in the sense that their difference would have an expected value of zero and zero variance. Therefore, it must be the case that the integral term equals (Delta)(C.sub.model,t). In other words, when the hedge is continuously rebalanced, the hedging error is simply equal to the time increment in the valuation error.

Table IV contains a summary of the hedging error results. Across the overall sample period, Model 0 - the Black-Scholes constant-volatility model - performs best of all the deterministic volatility function specifications. Its average root mean squared hedging error (RMSHE) is 45.5 cents, compared with 48.9, 50.5, 50.6, and 50.5 cents for Models 1 through 3 and Model S, respectively. The intuition for this result is that, although the model's option values are systematically incorrect, its errors are stable (or, at least, strongly serially dependent as suits a specification error), unlike the less parsimonious models. Within the class of DVF models considered, the results again indicate that, the more parsimonious volatility functions provide better hedging performance.

The ad hoc Black-Scholes procedure described in the preceding section also performs well from a hedging standpoint. The average RMSHE is only 46.7 cents. Consistent with the prediction results reported in Table III, the DVF option valuation model does not appear to be an improvement.

To further distinguish between the hedging errors of the different models, we run t-tests similar to the ones we performed for the prediction errors. The results are shown in Panel A of Table IV. With a t-ratio of 1.99, Model i represents a significant worsening relative to the plain Black-Scholes model.

(TABULAR DATA FOR TABLE IV OMITTED)

VII. Robustness

The results reported in the last three sections offer evidence that the volatility functions implied by index option prices are not stable through time. In developing our test procedures, however, we make a number of methodological decisions, some of which could be questioned in the sense that the final results may have been different had other methodologies been adopted. In this section, we investigate the robustness of our results by checking three issues of this kind. The first issue pertains to the choice of the quadratic functional forms given in equations (6) through (9). In particular, allowing volatility to grow quadratically with state variables violates the slow-growth assumptions necessary for the existence of a solution to the stochastic differential equation. The second issue pertains to the trade-off between the cross-sectional and the time-series goodness-of-fit. Derman and Kani (1994a,b), Dupire (1994), and Rubinstein (1994) recommend using a single cross section of option prices to parameterize the DVF model. In this way, the arbitrage-free spirit of the model is maintained. But are the model's predictions improved by using multiple cross sections simultaneously? The third issue concerns the uniformity of the results over various subsamples. Does the DVF model work better during specific subperiods? We study these three issues below.

A. Functional Form

The quadratic functional forms given in equations (6) through (9) may seem questionable for two related reasons. First, the use of the parabolic branches, for which there is no basis in fact and which are purely extrapolative in nature, may influence our results. Of course, the probability weights received by values of the underlying asset far from the current value become extremely small very quickly (at an exponential rate),

so they probably play a negligible role in the analysis. Nonetheless, this conjecture is worth checking. Second, it is questionable, mathematically speaking, to let the volatility grow quadratically with the state variable because such a volatility function violates the assumptions for existence of the solution of a stochastic differential equation (so-called "slow-growth" and "Lipschitz" conditions).

In **order** to allay these two fears simultaneously, we perform a simple experiment. In place of estimating Model 3 in an unconstrained manner, we truncate the local volatility rate at a maximum level of 50 percent annually, that is,

Model 3t: (Sigma) = max(0.01,min((a.sub.0) + (a.sub.1)X + (a.sub.2)(X.sub.2) + (a.sub.3)T + (a.sub.4)(T.sup.2) + (a.sub.5)XT, 0.50)), (16)

and then redo all of the steps of the analysis. The results appear in Table V. For convenience, the earlier results of Tables I, III, and IV for Model 3 are also presented. Examining the various entries of the table, we find that the (TABULAR DATA FOR TABLE V OMITTED) truncation makes no difference. The in-sample valuation errors, the out-of-sample prediction errors, and the hedging errors are virtually identical to those of the unconstrained version of the model for both the overall sample and the various option categorizations. In other words, the parabolic branches of the quadratic DVF models have not, in any way, obfuscated the analysis.

B. Two-Week Estimation

The second robustness test addresses the issue of the deterministic volatility function's stationarity. If we had truly believed in the permanency of the DVF model, we would have attempted to fit it to the entire five-year data sample with the same values of the coefficients throughout. It should be apparent by now, however, that no meaningful fit would have been obtained. To give the model the benefit of the doubt, we adopt the procedure advocated by the model's developers and fit it to the cross section of options available on one day only, and then determine whether the model could survive at least one week. By using comparatively little information, however, we may have introduced sampling variation. This sampling variation, as opposed to true parameter instability, may be responsible for the poor fit one week later. In **order** to address this possibility, we now redo the entire analysis, using the cross sections of two successive weeks for the in-sample estimation. We then investigate the quality of the fit out of sample by moving ahead by one more week, so that a total of three weeks are involved in the test.

The results for Model 3 are shown in Table VI. Not surprisingly, the insample fit (estimation mode) deteriorates slightly when going from one-week to two-week estimation. Forcing the same coefficient structure on two cross sections of option prices necessarily reduces in-sample performance. For the "All Options" category, for example, the RMSVE increases from 22.6 cents to 30.8 cents. For calls, the increase is from 21.8 cents to 29.7 cents, and, for puts, 23.0 cents to 31.4 cents.(26)

The prediction results are also reported in Table VI. Overall the improvement in out-of-sample performance is small. For the whole sample, the RMSVE is reduced from 55.5 cents to 54.4 cents. The subcategory results are mixed. For short-term options, the prediction performance is reduced, but, for intermediate and long-term options, the performance is improved. All in all, the results indicate that the additional variation in the time to expiration brought about by using two cross sections of option prices captures slightly better the relation between the local volatility rate and time.

The hedging performance results are noticeably improved as a result of the two-week estimation. For the full sample, Table VI shows that the RMSHE is reduced from 50.5 cents to 48.2 cents. Reductions in the RMSHE are also observed for the call and put option categories as well as for most of the (TABULAR DATA FOR TABLE VI OMITTED) option subcategories. Apparently, the two-week estimation has removed some of the sampling variation and has identified a coefficient structure that is more stable through time.

The overall performance of Model 3 estimated using two weeks of index option prices, however, still does not match the overall performance of the ad hoc Black-Scholes model fitted to a single cross section of prices (recall Table IV where the RMSHE is reported as 46.7 cents). Indeed, if one estimates the ad hoc Black-Scholes model using two cross sections of option prices, its sampling variation is reduced by even more than it is for Model 3. Though not shown in the table, its RMSHE falls to 40.8 cents. For calls and puts separately, the RMSHEs of the ad hoc Black-Scholes model estimated using the two-week estimation are 39.3 and 41.0 cents compared with 47.6 and 47.3 cents for Model 3. In other words, while increasing the amount of information used in estimation has identified coefficients that are more stable through time, the hedging performance of the ad hoc Black-Scholes model estimated using two cross sections of option prices shows even greater dominance over the DVF model than it does when only one cross section is used.

C. Analysis of Subsamples

The final issue has to do with performance through time. Does the DVF model perform better in some periods but not in others? To answer this question, we summarize the estimation, prediction, and hedging errors by calendar year. The results are reported in Table VII.

First, with respect to in-sample performance, the results are qualitatively robust across the sample. Using the AIC, Model 2 most frequently does best at describing the cross section of option prices in all subperiods. This is followed by the performance of Model 1. Again, parsimony in the volatility structure appears warranted. With respect to prediction, the ad hoc Black-Scholes model does best in every year except 1988, when its RMSVE is only slightly higher than Model 2's. Indeed, the outperformance is quite extraordinary in 1990, when its RMSVE is 54.2 cents versus 73.3 cents for Model 2. Finally, with respect to hedging performance, the ad hoc Black-Scholes (and the constant volatility Black-Scholes) model again dominates. All in all, the results of Table VII indicate that the poor performance of the DVF model is not driven by a particular subperiod of the sample. The DVF model performs poorly relative to an ad hoc procedure.

VIII. Summary and Conclusions

Claims that the Black and Scholes (1973) valuation formula no longer holds in financial markets are appearing with increasing frequency. When the Black-Scholes formula is used to imply volatilities from reported option prices, the volatility estimates vary systematically across exercise prices and times to expiration. Derman and Kani (1994a,b), Dupire (1994), and Rubinstein (1994) argue that this systematic behavior is driven by changes in the (TABULAR DATA FOR TABLE VII OMITTED) volatility rate of asset returns. They hypothesize that volatility is a deterministic function of asset price and time, and they provide appropriate binomial or trinomial option valuation procedures to account for this.

In this paper, we apply the deterministicvaluation approach to S&P 500 index option prices during the period June 1988 through December 1993. We reach the following conclusions. First, although there is unlimited flexibility in specifying the volatility function and it is always possible to describe exactly the reported structure of option prices, our results indicate that a parsimonious model works best in sample according to the Akaike Information Criterion. Second, when the fitted volatility function is used to value options one week later, the DVF model's prediction errors grow larger as the volatility function specification becomes less parsimonious. In particular, specifications that include a time parameter do worst of all, indicating that the time variable is an important cause of overfitting at the estimation stage. Third, hedge ratios determined by the Black-Scholes model appear more reliable than those obtained from the DVF option valuation model. In sum, "simpler is better."

Overall, our results suggest at least two possible avenues for future investigation. First, the deterministic volatility framework could be

generalized. The volatility surface, for example, may be related to past changes in the index level. Such a generalized volatility surface is probably the last candidate model that can be considered before resorting to fully stochastic volatility processes - processes that are difficult to estimate and that do not permit option valuation by the absence of arbitrage.(27)

Second, thought should be given to appropriate statistical test designs for competing volatility structures. The "null hypothesis" being investigated is that volatility is an exact function of asset price and time, so that options can be valued exactly by the no-arbitrage condition. Any deviation from such a strict theory, no matter how small, should cause a test statistic to reject it.(28) If a source of error had been introduced, some restriction on the sampling distribution of the error could be deduced and could provide a basis for a testing procedure.(29)

1 See Breeden and Litzenberger (1978), Bick (1988), and Bates (1996a, 1996b).

2 Rubinstein (1994) examines the S&P 500 index option market. Similar investigations have also been performed for the Philadelphia Exchange foreign currency option market (e.g., Taylor and Xu (1993)), and for stock options traded at the London International Financial Futures Exchange (e.g., Duque and Paxson (1993)) and the European Options Exchange (e.g., Heynen (1993)).

3 Webster (1994, p. 1100) defines a sneer as "a scornful facial expression marked by a slight raising of one corner of the upper lip."

4 Putting it succinctly, Black (1976, p. 177) says that "if the volatility of a stock changes over time, the option formulas that assume a constant volatility are wrong."

5 We use the reported index level for this exercise. Since this index is stale, the implied volatilities of call options will be biased downward or upward depending on whether the index is above or below its true level. With puts, the bias is opposite. By using only call options, the bias for each option is in the same direction. Longstaff (1995) has shown that using the wrong index level will create a smile, but a much fainter one than observed.

6 It is important to recognize that the moneyness variable in Figure 1 is adjusted by the square root of time. Without the adjustment, the slope of the sneer steepens as the option's life grows shorter. This is consistent with Taylor and Xu (1993), who demonstrate that more complex valuation models (such as jump diffusion) can generate time-dependence in the sneer even when volatility is constant over time.

7 The variation in the difference between **bid** and **ask** volatilities depends on two factors. First, although **bid**/**ask** spreads are competitively determined, they tend to vary systematically with option moneyness. In part, this may be caused by the CBOE's rules governing the maximum spreads for options with different premia. The rules state that the maximum **bid**/**ask** spread is (a) 1/4 for options whose **bid** price is less than $2, (b) 3/8 for **bid** prices between $2 and $5, (c) 1/2 for **bid** prices between $5 and $10, (d) 3/4 for **bid** prices between $10 and $20, and (e) 1 for **bid** prices above $20. See the Chicago Board Options Exchange (1995, pp. 2123-2124). Second, the sensitivity of option price to the volatility parameter is highest for at-the-money options, with in-the-money and out-of-the-money having much lower sensitivities. As a result, for a given spread between the **bid** and **ask** price quotes, the range of Black/Scholes implied volatilities will be lowest for at-the-money options and will become larger as the options move deeper in or out of the money.

8 Bergman, Grundy, and Wiener (1996) examine the implications of specifying volatility as a function of the underlying spot or forward asset price. They also illustrate a number of reasons for which volatility may be a (possibly nonmonotonic) function of the asset price.

9 Because the option price, c, and the underlying asset price, F, are expressed as forward prices (forward to the maturity date of the option),

equations (4) and (5) ignore interest and dividends. We account for these factors in our definition of forward prices. See Section III.D below.

10 We solve equation (5) using the Crank-Nicholson finite-difference method.

11 See Ait-Sahalia and Lo (1998).

12 The sample begins in June 1988 because it was the first month for which Standard and Poors began reporting daily cash dividends for the S&P 500 index portfolio. See Harvey and Whaley (1992) regarding the importance of incorporating discrete daily cash dividends in index option valuation.

13 The convention introduces an inconsistency, with small consequences, between option prices of different maturities. The inconsistency takes two forms. First, our forward index level assumes that the dividends to be paid during the option's life are certain, so the index cannot fall below the promised amount of dividends during this period. This barrier is different for each maturity date. This is an inconsistency in the specification of the process for the index. Second, the volatility function that we are estimating is actually a volatility of the forward price to the maturity date of the option. To be completely rigorous, we should model the forward price process for each maturity, with the appropriate cross-maturity constraints on price imposed, and estimate a separate volatility function for each.

14 Using **bid**/**ask** midpoints rather than trade prices reduces noise in the cross-sectional estimation of the volatility function.

15 See Fleming, Ostdiek, and Whaley (1996).

16 For a detailed description of the problems of using a reported index level in computing implied volatility, see Whaley (1993, Appendix).

17 In doing so, we impose the "cross-futures constraint" that the futures prices for different maturities should reflect the same underlying cash index level.

18 This is not quite true since we use Treasury bill rates in computing forward prices.

19 To assess the reasonableness of using the 2:45 to 3:15 p.m. window for estimation, we compute the mean absolute return and the standard deviation of return of the nearby S&P 500 futures (with at least six days to expiration) by fifteen-minute intervals throughout the trading day across the days of the sample period. The results indicate that the lowest mean absolute return and standard deviation of return occur just before noon. The end-of-day window is only slightly higher, but the beginning-of-day window is nearly double. We choose to stay with the end-of-day window for ease in interpreting the results.

20 Model 2 is also estimated without the time variable with little difference in explanatory power.

21 To test if the estimation results are driven by the presence of outliers, we examine the valuation errors of the various models. We identify unusually large errors for three days during the sample period. When we eliminate these days from the summary results, the magnitudes of the average errors reported in Table I are reduced by only small amounts. Consequently, we report the results for the full sample.

22 The identification of state price densities from option prices has been the goal of much of David Bates' work. See Bates (1996a, 1996b). See also Ait-Sahalia and Lo (1998).

23 The Black/Scholes procedure cannot serve to predict American or exotic option prices from European option prices, which is the major benefit claimed for the implied volatility tree approach.

24 We are extremely grateful to Ken West for his correspondence outlining the steps of the procedure below.

25 Admittedly, the assumption that we know the population values for all the parameters is incorrect. Each time we move down one week, we calculate the errors of the new week on the basis of the parameters of the old week. The t-statistics do not take into account the standard errors of the parameter estimation performed in the old week. As shown by West

(1996), the needed correction would depend on the expected value of the derivative of the prediction errors taken with respect to the parameter values. This would require repeated numerical calculation of the time series of errors, varying one parameter each time. There is no theoretical reason why this derivative would be equal to zero in our application, whereas it would have been if our estimators had been designed to optimize the prediction.

26 The slight differences between the one-week results reported in Table VI and those reported in Table V arise because one cross section of option prices is lost in the two-week estimation procedure.

27 For an empirical test of stochastic volatility models that uses out-of-sample performance, as we recommend, see Bakshi, Cao, and Chen (1997).

28 The same difficulty arises in any empirical verification of an exact theory. See MacBeth and Merville (1980), Whaley (1982), and Rubinstein (1985).

29 Jacquier and Jarrow (1995) introduce two kinds of errors in the Black/Scholes model: model error and market error, which they distinguish by assuming that market errors occur rarely. Other approaches to the problem include Lo (1986) who introduces parameter uncertainty, Clement, Gourieroux, and Monfort (1993) who randomize the martingale pricing measure to account for an incomplete market, and Bossaerts and Hillion (1997) whose error is due to discreteness in hedging.

REFERENCES

Ait-Sahalia, Yacine, and Andrew W. Lo, 1998, Nonparametric estimation of state-price densities implicit in financial asset prices, Journal of Finance 53, 499-547.

Akaike, Hirotugu, 1973, Information theory and the extension of the maximum likelihood principle; in Boris N. Petrov and Frigyes Csaki, eds.: 2nd International Symposium on Information Theory (Akailseoniai-Kiudo, Budapest, Hungary).

Bakshi, Gurdip, Charles Cao, and Zhiwu Chen, 1997, Empirical performance of alternative option pricing models, Journal of Finance 52, 2003-2049.

Bates, David, 1996a, Dollar jump fears, 1984-1992: Distributional abnormalities implicit in currency futures options, Journal of International Money and Finance 15, 65-93.

Bates, David, 1996b, Jumps and stochastic volatility: Exchange rate processes implicit in Deusche mark options, Review of Financial Studies 9, 69-107.

Bergman, Yaacov Z., Bruce D. Grundy, and Zvi Wiener, 1996, General properties of option prices, Journal of Finance 51, 1573-1610.

Bick, Avi, 1988, Producing derivative assets with forward contracts, Journal of Financial and Quantitative Analysis 23, 153-160.

Black, Fischer, 1976, Studies of stock price volatility changes, Proceedings of the 1976 Meetings of the American Statistical Association, Business and Economic Statistic Section, 177-181.

Black, Fischer, and Myron S. Scholes, 1973, The pricing of options and corporate liabilities, Journal of Political Economy 81, 637-659.

Bossaerts, Peter, and Pierre Hillion, 1997, Local parameter analysis of hedging in discrete time, Journal of Econometrics 81, 243-272.

Breeden, Douglas, and Robert Litzenberger, 1978, Prices of state-contingent claims implicit in option prices, Journal of Business 51, 621-651.

Chicago Board Options Exchange, 1995, Constitution and Rules.

Clement, Emmanuelle, Christian Gourieroux, and Alain Monfort, 1993, Prediction of contingent price measures, Working paper, Institut National de la Statistique et des Etudes Economiques (Paris).

Constantinides, George, 1997, Transaction costs and the implied volatility smile, Working paper, Graduate School of Business, University of Chicago.

Derman, Emanuel, and Iraj Kani, 1994a, The volatility smile and its

implied tree, Quantitative Strategies Research Notes (Goldman Sachs, New York).

Derman, Emanuel, and Iraj Kani, 1994b, Riding on the smile, Risk 7, 32-39.

Dupire, Bruno, 1993, Pricing and hedging with smiles, Working paper, Paribas Capital Markets, London.

Dupire, Bruno, 1994, Pricing with a smile, Risk 7, 18-20.

Duque, Joao, and Dean Paxson, 1993, Implied volatility and dynamic hedging, Review of Futures Markets 13, 381-421.

Fleming, Jeff, Barabara Ostdiek, and Robert E. Whaley, 1996, Trading costs and the relative rates of price discovery in the stock, futures, and option markets, Journal of Futures Markets 16, 353-387.

Galai, Dan, 1983, The components of the return from hedging options, Journal of Business 56, 45-54.

Harvey, Campbell R., and Robert E. Whaley, 1992, Dividends and S&P 100 index option valuation, Journal of Futures Markets 12, 123-137.

Heston, Steven L., 1993, A closed-form solution for options with stochastic volatility with applications to bond and currency options, Review of Financial Studies 6, 327-343.

Heynen, Ronald, 1993, An empirical investigation of observed smile patterns, Review of Futures Markets 13, 317-353.

Hull, John, and Alan White, 1987, The pricing of options on assets with stochastic volatility, Journal of Finance 42, 281-300.

Jackwerth, Jens C., and Mark Rubinstein, 1996, Recovering probability distributions from option prices, Journal of Finance 51, 1611-1631.

Jacquier, Eric, and Robert Jarrow, 1995, Dynamic evaluation of contingent claim models (An analysis of model error), Working paper, Cornell University.

Lo, Andrew, 1986, Statistical tests of contingent-claims asset-pricing models: A new methodology, Journal of Financial Economics 17, 143-173.

Longstaff, Francis A., 1995, Option pricing and the martingale restriction, Review of Financial Studies 8, 1091-1124.

MacBeth, James D., and Larry J. Merville, 1980, Tests of the Black/Scholes and Cox call option valuation models, Journal of Finance 35, 285-301.

Rubinstein, Mark, 1985, Non-parametric tests of alternative option pricing models using all reported trades and quotes on the 30 most active CBOE option classes from August 23, 1976 through August 31, 1978, Journal of Finance 40, 455-480.

Rubinstein, Mark, 1994, Implied binomial trees, Journal of Finance 49, 771-818.

Schwert, G. William, 1989, Why does stock market volatility change over time?, Journal of Finance 44, 1115-1154.

Schwert, G. William, 1990, Stock volatility and the crash of ’87, Review of Financial Studies 3, 77-102.

Taylor, Stephen J., and Xinzhong Xu, 1993, The magnitude of implied volatility smiles: Theory and empirical evidence for exchange rates, Review of Futures Markets 13, 355-380.

Webster’s II, 1994, New Riverside University Dictionary (Houghton Mifflin Company, Boston, MA).

West, Kenneth D., 1996, Asymptotic inference about predictive ability, Econometrica 64, 1067-1084.

Whaley, Robert E., 1982, Valuation of American call options on dividend-paying stocks: Empirical tests, Journal of Financial Economics 10, 29-58.

Whaley, Robert E., 1993, Derivatives on market volatility: Hedging tools long overdue, Journal of Derivatives 1, 71-84.

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Automation of Securities Markets and Regulatory Implications

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I. Introduction and summary

Since the early eighties, securities markets within and outside the OECD area have been subject to important reform efforts undertaken both by the authorities and the securities industry itself There is no other sector within the broad area of the financial services markets in which organisational, structural and regulatory changes have reached such dimensions as in the field of securities-related activities.

Reform and modernisation efforts both by policy makers and the securities and banking industry have closely interacted to serve three basic policy goals:

to improve the efficiency of securities markets;

to maintain systemic stability, safety and soundness in the financial sector as a whole;

to enhance investor protection.

Public policy has mainly aimed at improving market efficiency by enhancing market forces through a determined process of dismantling still existing obstacles to price, product and geographical competition ("deregulation"). At the same time the other two policy objectives - systemic stability and investor protection - have been addressed by a general strengthening of both prudential regulation and supervision and rules and regulations designed to protect in particular the small investor against fraud, manipulation and other malpractices including the abuse of insider information ("re-regulation").

The securities and banking industries' efforts have largely been directed not only towards strengthening the competitiveness of individual firms but also towards collectively creating more efficient, fairer and more visible markets to the benefit of all market participants alike: fund raisers, investors and intermediaries. In this context recourse to modem information technology (IT) has received increasing attention. It is difficult to say whether the securities industry has "discovered" modem IT

or whether it has been IT which has "conquered" the stock exchanges.

Be that as it may, the various interrelated but nevertheless distinct processes which taken together make up what is commonly called "the functioning of securities markets" lend themselves in an almost ideal way to computerisation. This is notably the case for processes such as **order** collection and **order** routing; the price determination process be it a single price auction, a continuous price auction or a market making process); **order** execution, confirmation and comparison ("matching"); clearing and settlement; notification of **order** execution to buyers and sellers; trade reporting both for market surveillance and market information purposes; and the dissemination of market information.

Indeed, modem IT has triggered a process of a dramatic re-shaping of the whole securities markets landscape. The stock exchange floors of the good old times are increasingly replaced by decentralised screen-based trading networks, which in fact have, technically speaking, the potential for replacing local or national markets by a world-wide market system. The time frame within which processes and procedures such as **order** routing, **order** execution and the dissemination of market information take place is shrinking fast and is approaching "real time" in many instances. Previously fragmented markets with official" markets operating side by side with unregulated over-the-counter markets have increasingly been integrated into unified screen-based systems so that in many instances the traditional distinction between ,on-" and "off-floor" operations is no longer valid. Ingenious portfolio managers increasingly operate cost-efficient, safe and fast "on-line" **order** routing systems which link them directly with afl major financial centres of the globe.

In sum, automation has considerable potential for improving the efficiency of securities market while at the same time providing scope for important improvements in market surveillance through computerised trade reporting. So-called "audit trails" i.e. minute-by-minute records of trading with aU essential details concerning the parties in a deal, time, prices, amounts etc. make it possible to detect irregularities in the trading process immediately as well as over longer periods of time. By the same token, computerised clearing and settlement systems have considerable potential for reducing counterparty risks.

In other words, developments so far demonstrate convincingly that modem IT has considerable potential for contributing forcefully to pursuing simultaneously the three basic objectives of financial policy - efficiency, systemic stability and investor protection. Thus, the ongoing automation process in securities markets raises important issues for financial policy. It can indeed be argued that policy makers should not, and in fact cannot, escape taking a stand vis-&-vis the question of how to take more active interest in the automation of securities markets than has hitherto been the case in most countries.

Policy solutions could be sought in several directions. As a first step, arrangements could be put in place under which the competent authorities, in close co-operation with market participants, effectively monitor the ongoing automation process in securities markets. As far as further steps are concerned, regulation could subsequently be enacted according to which the introduction of automated systems for **order** routing, trading, **order** execution, clearing and settlement etc. would be subject to notification and examination procedures so that basic financial policy considerations can be taken into account in developing such systems. Whatever approach may be chosen it is important from an overall policy point of view that the potential for the integration of markets and for improving their visibility and surveillance as well as for containing systemic risks that is offered by such systems is exploited as much as is acceptable from a reasonable cost/benefit point of view.

11. Overview of the automation process in securities markets

A. Scope for automation of securities market processes

The technical and organisational operation of securities markets and

the processing of securities market transactions consist of a number of distinct functions and processes which lend themselves to computerisation separately or in various combinations. Thus, providing a reasonably adequate picture of the state of computerisation of a given securities market requires examining each of these different functions and processes and indicating the automation linkages between them.

With a view to providing a framework for a description of the automation of securities markets it is useful to distinguish between the following functions and processes lending themselves to automation:

a) The securities transaction process

i) **Order** collection and **order** routing

Two steps may be distinguished:

order collection from ultimate buyers and sellers;

order routing from the **order** collectors to the members of the stock exchange or OTC markets i.e. to the participants in the price determination process.

ii) Price determination process

Three methods, each requiring different software solutions to computerisation, may be distinguished:

with one price per security fixed per trading session;

with several prices for one security being established during the trading session; this system requires a continuous feeding of buy and sell orders into the screen-based **order** confrontation system while in the aforementioned system all buy and sell orders are collected by the computer up to the moment when the price fixing is carried out; in a continuous price auction the latter method is used for establishing the opening price.

with one market maker (specialist), or several competing market makers, providing **ask** and **bid** prices on a continuous basis during trading hours; the prices quoted on the screen may be indicative in nature (i.e. subject to negotiation by telephone) or binding in respect of specified amounts bought or sold; to the extent that a market maker system displays its "limit **order** book" it resembles an automated auction system.

iii) **Order** execution, confirmation and comparison ("matching")

Once the price applying to a particular buy or sell **order** is established various steps of processing are necessary for executing the buy (sell) **order** together with the other side of the deal i.e. the corresponding sell buy) **order**. Instructions need to be given to the depository system(s) involved for effecting the transfer of ownership of the security in question from the seller to the buyer; at the same time instructions need to be fed into the payment system for effecting the transfer of the selling proceeds (i.e. the payment) from the buyer to the seller. A comparison and "matching" of the two sides of a deal (corresponding buy and sell orders) is indispensable for a proper functioning of the clearing and settlement process.

iv) Clearing and settlement

The transfer of ownership of the securities in question from the seller to the buyer and the corresponding money payment from the buyer to the seller are the final steps in the execution of a deal. The two processes may be combined i.e. based on the principle of "delivery against payment" or may be operated separately. The transfer of the tide" of ownership may be centralised in a central securities depository system or may involve decentralised systems in various ways. Payments may also be effected in various ways. Thus, in practice, a relatively wide range of solutions to the computerisation of these clearing and settlement processes is available.

v) Notification of **order** execution to sellers and buyers

This process corresponds largely to a "reversal" of the **order** collection and **order** routing process referred to under i); these two processes together - i) and v) - are sometimes referred to as **order** book handling. This typical "back office" activity also lends itself to full automation ("electronic client **order** book").

b) Market information systems

Once securities prices are determined via the auction or trading process and visibly quoted, dealers as well as other market participants need to be informed as quickly as possible of the new quotations. Information on current quotations may for transparency/visibility reasons be combined with corresponding **information** on trading volume ("last trades reporting"). Automation efforts have often concentrated in particular on this aspect of the "functioning of markets". **Market information** systems in a wider sense may also include the dissemination of company **information** which is relevant for the equity **price** formation process. A particular aspect of automated **market information** systems is the computation, at short-term intervals (every minute for example), of share **price** indices without which markets for index futures could not operate.

c) **Market** surveillance systems

Organised securities markets are generally obliged under their rules of procedure to supervise trading activity with a view to identifying irregular trading behaviour. The computerisation of the **price** determination process or of current trade reporting opens up unique opportunities for facilitating the **market** surveillance process. All that is needed is to feed **data** on all aspects of trading **price**, volume and time of each deal) into a separate surveillance and **information** storage system ("audit trail").

d) National and international **market** linkages

In countries with several stock exchanges or market systems, computerisation is increasingly used for linking these traditionally separate local market-places in such a way that they operate as one single market. Effective linkages require efficient computerised real-time price dissemination and price comparison systems as well as fast **order** routing systems between the local markets. International linkages between national market-places begin to be established on the same principles.

B. Country developments

In practice, there are considerable differences from country to country or market to market as regards the level of automation so far achieved as regards the various functions and processes that have just been described; and because of these diversities it is indeed difficult to generalise and classify countries according to degree of automation of securities markets, all the more so as automation in this field is in a process of rapid change and advance. Some countries have had very efficient automated clearing and settlement systems in place for quite some time while trading i.e. the price determination process, is still based on the open outcry principle or the single price auction principle. Other countries may have highly automated dealing systems while still being faced with serious problems at the level of **order** routing or clearing and settlement. As regards the level of automation, there may also be considerable differences between markets according to instruments, for example, between equity markets, bond markets and derivative markets. Tradition and "market age" may play an important role in this regard. Relatively new markets such as those for financial futures and options have, in several instances, been set up as fully computerised and integrated market systems, while traditional, sometimes several hundred year old, stock exchanges have sometimes been slow in implementing automated **order** execution, trading or other systems relating to the technical operation of securities markets. In the following paragraphs an attempt is made at providing a brief overview of the automation process in the securities markets of Canada, France, Germany, Switzerland, the United Kingdom, the United States and other countries.

Canada

Developments in Canada as regards the automation of securities market processes are broadly characterised by the juxtaposition of centralised and decentralised approaches. While the clearing and settlement process in equities and bond markets is largely centralised in the highly computerised

Canadian Depository for Securities (CDS) and while major securities houses and specialised service firms have **order** routing systems in place which operate on a nationwide basis, there are considerable differences in the automation of the major stock exchanges. The Toronto Stock Exchange, with the introduction, in 1977, of its CAT System, has clearly been a pioneer in the field of stock market automation, although the CAT System itself has not so far played a predominant role in trading on the Toronto Stock Exchange as the most active shares have continued to be traded on the floor. Floor trading, however, has also been subject to considerable automation efforts, essentially through the introduction of two systems: first, MOST ("Market **Order** System for Trading") which guarantees execution of market orders at the quoted price for up to 2 099 shares for designated stocks and not less than 599 shares for any other stock; second, LOTS ("Limit **Order** Trading System") which provides a screen-based limit **order** book for all stocks traded on the floor. In addition, the Toronto Stock Exchange operates on behalf of the Ontario Securities Commission the COAT System ("Canadian Over-the-counter Automated Trading System") for the trading of unlisted securities in the Province of Ontario. This system has been modelled on the NASDAQ System of the United States.

The Montreal Stock Exchange introduced in 1983 its MORRE System (the "Montreal Exchange Registered Representative **Order** Routing and Execution System") which is an automated small **order** execution system providing best execution for Montreal-Toronto listed shares for orders ranging between 599 - 2 099 shares. The system was upgraded in 1988 which allowed the inclusion of 300 additional shares in the system so that now some 500 shares are covered by the system. MORPE will soon serve specialist needs with an electronic limit **order** book that sorts orders and writes confirmation tickets. FAST, the fully automated securities trading system, will soon execute routine transactions automatically for inactive shares that are not assigned to a specialist. The VCT ("Vancouver Computerised Trading") System went into operation. It started in February 1988 with 25 so-called development stocks and now covers all of these stocks (about 1500) listed on the Exchange (accounting for about 70 per cent of the trading volume).

It should be stressed that the Canadian securities industry has traditionally paid considerable attention to the need for an adequate real-time dissemination of market information on a national and worldwide basis all the more so as many Canadian shares are traded outside the country, notably in the United States but also in the United Kingdom.

France

Efforts towards the automation of securities markets in France form an integral part of policy designed to modernise the French financial system and to strengthen its international competitiveness. The centrepiece of the automation process was the introduction, in July 1986, of the CAC System ("Cotation Automatisee en Continu"), which has been modelled on the CAT System of the Toronto Stock Exchange). By the end of 1989, all securities - shares and bonds - formerly traded on the floor of the Paris Bourse were traded through the computerised CAC System, which is essentially a centralised screen-based **order** book system in which matching orders are automatically executed. Parallel to the phasing-in of the CAC System considerable automation efforts have been made in two directions: first, in the complex field of **order** handling (the collection, routing, and confirmation of orders, and more generally the management of client **order** books by banks and stock exchange member firms); second, in the field of real-time market information dissemination.

Derivative markets in France - the MATIF ("Marche A Terme International de France"), and MONEP ("Marche d'Options Negociables de Paris") - have also been subject to important automation efforts. Although the MATIF still operates on the open outcry principle its clearing, settlement and centralised deposit guarantee system is fully automated. ICCH (France) SA, the French subsidiary of the International Commodities Clearing House (ICCH), has played a leading role in the development of the

corresponding technology and software. - The OMF System, a fully automated and integrated trading, clearing and settlement system which traded a stock index futures contract, "OMF 50", and options on such contracts, has in the meantime been withdrawn from the market as a result of too fierce competition. - The OMF System was operated by a private company, OMF, in which important French banks held participations. OMF was the French subsidiary of a Swedish banking group specialised in the operation of derivative market systems which has also corresponding subsidiaries in some Nordic countries other than Sweden. - Efforts in France have more recently been concentrated on a complete modernisation of the clearing and settlement process in the French stock market to meet the new standards set in this field by "ISSA - 4", the Group of Thirty and the FIBV. The first functions of RELIT "Reglement - Livraison de Titres") became operational towards the end of 1989. Other innovations in the field of automation include a refinement of the Cac-System designed to provide more scope for the intervention of "specialists" i.e. to introduce some elements of market making; further improvements in the field of small-**order** handling, and the extension of home banking facilities (via Minitel) to the securities market area. In January 1991, automation efforts in the French securities markets culminated in the merger of the Paris Bourse with the six regional stock exchanges which gave rise to the birth of one single nation-wide securities market in the country.

Germany

The history of the automation of securities market processes in Germany started practically in the late sixties when the essential decisions were taken to automate the clearing and settlement process and some other services such as custodian services and the collection and dissemination of market information. As a result, two data processing centres were set up: first, the BDZ "Borsen-Daten-Zentrale") GmbH in Frankfurt which provides these services for the stock exchanges in Frankfurt, Hamburg and Hannover as well as for the "Auslandskassenverein" i.e. the clearing centre for transactions with non-residents; second, the BDW ("Betriebsgesellschaft fur Datenverarbeitung und Wertpapiere") in Dusseldorf which operates also for the stock exchanges in Berlin, Munich and Stuttgart.

The co-operation between the two centres was gradually strengthened - in the seventies, by the setting up of an on-line link; in 1986, by the creation of the Deutsche Gesellschaft fur Wertpapier-systeme GmbH (which has been in charge of harmonising the data processing systems in securities markets) - and culminated in 1988 in the creation of the DWZ ("Deutsche Wertpapierdaten-Zentrale") GmbH, Frankfurt, which practically represents a merger of the two former centres.

Amongst the manifold tasks of the DWZ the following may be mentioned in particular: development of an automated quotation display system for the OTC market i.e. trading outside the official trading session (IBIS = Inter-Banken-informations-system); this system became operational in 1989 and has in the meantime been transformed into a fully integrated trading and information system (IBIS = Integriertes Borsenhandels- und Informations-system) becoming operational in April 1991. It should mentioned that the introduction of IBIS in its initial version as a market information system gave rise to the introduction of a similar competing information system (MATIS) operated by the German Securities Brokers Association;

re-organisation, centralisation and integration of the clearing and settlement process;

improvement in custodian services;

improvement in the dissemination of real-time market information;

further development of automated **order** routing systems.

At present, the following automated **order** routing systems are in operation:

BOSS ("Borsen-**order**-service-system") for options, partially introduced at the Frankfurt Stock Exchange in January 1989; BIFOS (Borsen-

Informations-und Orders-system") partially introduced at the Dusseldorf Stock Exchange in October 1988. The latter system appears to have considerable potential for **order** handling in general as well as for developing effective real-time linkages between the German stock exchanges.

While the systems just mentioned are automated floor systems which will not replace the floor, the DTB ("Deutsche Terminborse") i.e. the German Financial Futures and Options Exchange, has been operating since 1990 as a fully automated market maker exchange like SOFFEX, the Swiss Options and Financial Futures Exchange.

Switzerland

In Switzerland, automation efforts in the securities market area have been concentrated primarily on the dissemination of market information, although first - technically successful - attempts at automating the pricc determination process go back to the sixties. While these first attempts at automating the floor of the Zurich Stock Exchange have not been followed up, major breakthroughs in the automation of information systems were achieved, first, with the setting up of the Telekurs AG (owned by some 350 banks) which is not only a major collector and provider of market information but acts also as a major promoter of securities market technology; second, with the foundation of Association Tripartite Bourse (ATB) (created by the stock exchange of Zurich, Geneva and Basle). Both entities have been major driving forces behind technology developments in the Swiss securities markets.

Major achievements that may be mentioned in this regard are:

the introduction of RIS ("**Ring**-informations-system) in 1986/87 (providing real-time information on quotations, last trades and company news from the three main stock exchanges simultaneously);

the creation of SOFFEX (Swiss Options and Financial Futures Exchange), a fully automated and integrated trading, clearing and settlement system, which started its operations in May 1988;

various measures (taken in 1988) designed to improve the clearing and settlement process; introduction of an automated settlement and reconciliation system; creation of the Swiss Nominee Company (making it possible to trade foreign registered shares like bearer shares); creation of a centralised depository system for Swiss registered shares; creation of Intersettle (Swiss corporation for International Securities Settlement).

Amongst the projects which are under preparation, the introduction of a fully computerised Swiss securities market (EBS = "Elektronische Borse Schweiz" i.e. the Swiss Securities Trading System) deserves particular attention. The system which in 1989 starts to be phased in, is expected to be fully operational in 1992 and will then function as a fully automated and integrated **order** routing, **order** matching, **order** execution, market information (including trade reporting), and clearing and settlement system.

United Kingdom

In the United Kingdom, automation efforts in the securities markets concentrated in the 1970s on settlement and information services, and in the 1980s chiefly on information and trading services. A major breakthrough was achieved in 1986 will the introduction of the SEAQ ("Stock Exchange Automated Quotation") System which was originally modelled on the NASDAQ System in that both systems are **quote** driven, competing market maker systems. However, the resemblance between the two systems is no longer of great significance. SEAQ shows much larger numbers of screen prices in categories of stocks which are more akin to the New York Stock Exchange Big Board. It is interesting to note that SEAQ International, the computerised quotation system for internationally traded shares, was put into operation before "Big Bang" i.e. in 1985.

Automation efforts have more recently concentrated on improving **order** routing and execution systems as well as the clearing and settlement process. The International Stock Exchange in London (ISE) has in recent years put into operation a small **order** execution system: SEAF ("Stock Exchange Automated Facility"), which competes with two private

systems put into place by Kleinwort Benson and Barclays de Zoete. On the clearing and settlement side efforts are undertaken to implement the recommendations of "ISSA - 4", the Group of Thirty and the FIBV through the development of TAURUS which will perform different and additional functions (as compared with the present TALISMAN System) which will allow the following operations:

a) the replacement of stock transfers and certificates by electronic registration of shareholdings and transfers;

b) the establishment of an electronic share depository;

c) ultimately) the automation of the "safely completed trade" process to final delivery and payment.

Other interesting developments in the London market as far as automation of markets is concerned are the automation project of LIFFE (London International Futures Exchange) called APT ("Automated PIT Trading") and the trade comparison/trade reporting system of the AIBD (Association of International Bond Dealers) named TRAX ("Transaction Exchange"). APF is an entirely new development which attempts to replicate electronically the open outcry trading technique and could ultimately replace the floor. The development of AURORA by the Chicago Board of Trade goes in the same direction. TRAX of the AIBD is designed to improve the functioning of the Eurobond market through automated trade comparison which facilitates the clearing and settlement process. The system also serves to meet the trade reporting requirements under the UK Financial Services Act as far as Eurobond transactions are concerned. It may be noted in this context that the International Stock Exchange in London has developed its own trade confirmation system, SEQUAL, which provides for equities facilities (for trade reporting and confirmation) similar to those provided by TRAX for bonds.

United States

Automation of securities market processes in the United States has a long and complex history. Milestones in the development of automated market information systems have been:

1963 SEC proposal to enhance visibility of the OTC ("pink sheet") market through an automated quotation display system;

1971 Creation of the NASDAQ System by the National Association of Securities Dealers;

1974 Introduction of the Consolidated Transaction Reporting System;

1978 introduction of the Consolidated Quotation System.

While the NASDAQ System, which was originally intended as an information system, turned out to become a most dynamic market system based on multiple competing market makers, the other two systems are automated trade and quotation reporting systems which collect these data from the NYSE, AMEX and the regional exchanges for dissemination to market participants, including the exchanges themselves, on a real-time basis. Both systems are operated through the Securities Industry Automation Corporation (SIAC) in New York City. Plans for a similar real-time dissemination of option **market information** developed by the Options **Price** Reporting Authority (OPRA) are at present under consideration by the SEC.

The history of automated **order** routing and execution systems started in 1969 with the introduction by the Pacific Stock Exchange (PSE) of its COMEX System, now called SCOREX "Securities Communication **Order** Routing and Execution") which in fact is an automated small **order** routing and execution system that executes orders of up to 1 099 shares in eligible securities at best **bid** or offer prices that are available at the Intermarket Trading System (ITS; for ITS see further below).

Similar systems are operated by two other regional exchanges - the MAX ("Midwest Automatic Execution") System by the Midwest Stock Exchange, the PACE ("Philadelphia Stock Exchange Automated Communication and Execution") System by the Philadelphia Stock Exchange - while the Cincinnati Stock Exchange developed, in 1978, a fully automated stock

exchange system which is based on competitive market makers: the National Trading System also executes market limit orders (up to 2 099 shares) at the ITS best **bid** or offer price.

The NYSE and AMEX introduced floor automation systems in 1976 (DOT = Designed **Order** Turnaround System) and 1977 (PER = Post Execution Reporting), respectively. DOT is essentially an automated **order** routing system with automated execution capabilities through which orders are routed from broker offices to the floor specialists. At present, market limit orders of up to 30 099 shares are passed through the DOT System, which thus handles about 70 per cent of the NYSE **order** flow. One application of DOT is OARS ("Opening Automated Report Services") through which orders of up to 30 099 shares are, channelled to the specialist before the opening price is fixed.

A special development in the automation of the US securities market is the - already mentioned - Intermarket Trading System (ITS) which was introduced in 1978. ITS is an **order** routing system based on real-time quotation information which effectively links all US stock exchanges and the NASDAQ market enabling brokers to identify on a real-time basis best **bid** and offer prices for interlisted, securities and channel their orders accordingly.

Options exchanges have also developed automated floor systems for **order** routing and execution. Thus, the Chicago Board Options Exchange (CBOE) introduced in 1985 RAES ("Retail Automatic Execution System").

As far as markets for financial futures are concerned the GLOBEX System developed by the Chicago Mercantile Exchange (and approved by the CFTC in February 1989) has recently made the headlines of the financial press and was originally planned to be put into operation in the Autumn of 1989. It is now (June 1991) expected that GLOBEX will not start before 1992.

Besides these automated systems operated by the exchanges or NASD, two so-called proprietary trading systems developed in the United States may be mentioned in this context: INSTINET and POSIT. Both systems have been authorised as broker systems and provide **order** display and certain **order** execution capabilities, essentially for institutional trades. INSTINET (owned by Reuters) maintains also international linkages through its terminal network.

Clearing and settlement systems are generally highly automated although the situation in this area appears to be characterised by a certain degree of decentralisation which is highlighted by the fact that taking securities and derivative markets together there are at present some eleven clearing, settlement and depository systems in operation not mentioning private banking facilities in this field.

Further automation efforts by the NASD have recently been extended to two distinct segments of the US securities markets: the private placements markets and the market for OTC stocks, i.e. the market for so-called "pink sheet" equities which do not meet the listing standards of neither the traditional stock exchanges nor the NASDAQ market. PORTAL, an automated quotation and **order** execution system for privately placed securities, was introduced in June 1990 in response to SEC Rule 144a which liberalised the sale of such securities to Qualified Institutional Buyers (QIBS). The OTC Bulletin Board, also introduced in June 1990, provides, like NASDAQ in its initial phase, screen-based real-time quotation information for OTC securities thereby enhancing the visibility of this market segment quite considerably.

Further automation efforts in the US are likely to be largely concentrated on two developments; improving the clearing and settlement process on the one hand, and exploring the scope for international trading linkages on the other. The GLOBEX plan for links with the MATIF and the Sydney Futures Exchange and the NASDAQ links with London and Singapore may be indicative in this regard. Nevertheless, it should be mentioned in this context that the trading and quotation links between the Toronto Stock

Exchange and AMEX and the Midwest Exchanges established in 1985 and 1986 respectively were disconnected in October 1988 because of insufficient use.

Other countries

In many countries other than those specifically dealt with in the preceding paragraphs there have been similarly strong automation efforts in securities markets. It may be fair to generalise that practically all countries have taken steps in recent years, or are in the process of taking steps, towards improving market information systems and **order** routing systems on the one hand and the clearing and settlement process on the other.

As far as trading systems in a general sense are concerned, it is noteworthy that a number of stock exchanges not so far mentioned have introduced automated **order** book - or **order** matching - systems of the type developed by the Toronto Stock Exchanges i.e. the CAT System. The stock exchanges of Brussels, Madrid and S. Paolo have actually adopted CATS, thus following the example of the Paris Bourse. The Tokyo Stock Exchange introduced CORES ("Computer Assisted **Order** Routing and Execution System"), which is also based on the limit **order** book - or **order** matching - principle, in 1982 for equities listed in the Second Section. The system was designed and developed by the Tokyo Stock Exchange with first experiments in computer simulation of stock exchange trading going back to 1962. A special feature of CORES, in contrast with other computerised **order** matching systems, is that the official broker, the Saitori, has maintained his function in the **order** matching process. CORES covers some 1350 equities thus leaving some 150 equities to traditional floor trading. The last reduction in traditionally traded equities, from 250 to 150, took place in May 1988 when CORES capability was upgraded.

The Australian Stock Exchange, the Taipei Stock Exchange and a number of other stock exchanges in South-east Asia (Hong Kong, Singapore, Kuala Lumpur) apply the same **order** confrontation principle (auction price method) as used by CATS in Toronto; many exchanges have, however, developed their own software solutions. In the meantime, the Taipei Stock Exchange System has been introduced in other countries including Malaysia and Mexico as well. In Italy, a similar system, or combination of systems, named BORSAMAT, has been developed in 1985/1986 by CED BORSA, a cooperative owned by the Milan stockbrokers. Other stock exchanges having made considerable automation efforts include the exchanges of Copenhagen Oslo, Rio de Janeiro, Santiago, Seoul and Singapore, and there are likely to be others as well. However, there is a general impression that most of these exchanges have not gone as far in the automation process as the stock exchanges of Copenhagen, Oslo, and Rio de Janeiro which now operate as fully automated and integrated information, **order** handling, trading and clearing and settlement systems.

It should be mentioned in this context that the well-established market integration capabilities of automated market systems are now increasingly, albeit hesitantly, tried out" for international market linkage purposes. Market integration efforts amongst the EC Member countries, which may be seen as going back to January 1978 when the idea of IDIS (Interbourse Data Information System) was launched, received a new impetus with the signing, on]8th May 1990, by the stock exchange organisations of the Twelve of the joint venture agreement" on the setting up of "Euroquote SA", a Brussels-based joint stock company, designed to facilitate securities trading within the EC area. The task of the new company, which has not yet come into existence, would be to create the technological infrastructure in three basic areas: first, collection and re-dissemination of essential market data and information; second, development and operation of an automated communication network inter-linking on a real-time bases an securities exchanges and there respective member firms as well as certain third parties (presumable including supervisors); third, facilities for automated **order** routing, **order** execution and confirmation, and automated clearing

and settlement instructions and procedures.

Market integration efforts amongst the Nordic countries have so far been more successful, but probably also less ambitious, than those amongst the EC countries. All Nordic stock exchanges are now interlinked via real-time quotation information systems while cross-border **order** routing is still carried out via the telephone network. Similar inter-market systems are under close consideration in South America. It is probably fair to say that in one way or another all these new inter-market systems are modelled on the US Inter-market Trading System ITS).

An overview of the automation process in securities markets would be biased if no mention were made of the less successful automation projects launched during the last twenty years or so. The first attempt to automate the auction price fixing process at the Zurich Stock Exchange goes back to the sixties, as has already been mentioned. Although the technology was available at that time, market participants clearly preferred the traditional floor procedures. The Association of International Bond Dealers (AIBD) made two attempts to introduce a NASDAQ type of quotation display system, one in the seventies (EUREX) and one more recently, but has so far been unable to overcome resistance amongst major Eurobond dealers against automated trading or market making. A similar kind of resistance against the inclusion of the most actively traded shares in existing automated **order** matching systems is still being felt at the stock exchanges of Australia, Tokyo and Toronto.

In a record of failures, ARIEL - a London based automated **order** matching system for institutional trading - should be mentioned as well. The failure of the US/Canada trading and quotation links have already been mentioned in the note on the United States. The conclusion one may draw from this short list - which could become somewhat longer in future (IDIS, mentioned above, should in fact be added to this list) - is that automation by itself is not necessarily a guarantee for success. A successful automation of securities markets needs to be based on genuine demand by market participants and should, secondly, not be introduced without adequate cost/benefit considerations.

III. Regulatory issues pertaining to the automation of securities markets

Regulatory issues pertaining to the automation of securities markets are most usefully discussed against the background of the three basic financial policy objectives: efficiency, systemic stability and investor/client protection as financial regulation is not, or should not be, an end in itself but should rather serve as an instrument of financial policy. The present Section Ill is divided in two parts. Part A attempts to explore the scope offered by modem information technology for achieving basic goals of financial policy in the securities market area. Part B deals with the more difficult and complex question of how regulators and financial policy makers could proceed in steering the automation process in the right direction, i.e. in accordance with major policy goals and broad principles of financial policy.

A. Automation of securities markets and financial policy objectives

Financial policy, i.e. policy dealing with financial institutions and markets, generally pursues three broad objectives:

to improve the efficiency of financial systems;

to ensure the stability and soundness of the financial system (i.e. to contain systemic risk) (1);

to maintain an adequate level of investor and general client protection and investor confidence.

Under the impact of accelerating internationalisation of financial markets and interpenetration of national financial systems many countries have added to this list a fourth objective:

to strengthen the international competitiveness of their countries' financial institutions and markets.

The addition of this particular objective to the list of broad financial policy objectives has worked as an important accelerator in

financial system reform efforts which also include the automation of securities and derivative markets. As far as policies towards securities markets are concerned the objectives have sometimes been formulated in somewhat more specific terms:

"to protect investors and to foster fair, orderly, and competitive markets 2)"; or

"to maintain conditions of equity, safety and transparency 3)" in securities markets.

The question for discussion in this Section is whether, to what extent, and how, the application of modem data processing and telecommunication technology can assist financial policy makers, regulators and self-regulatory bodies in pursuing these broad policy objectives.

i) improving the efficiency of securities markets

Case studies of automated securities market systems provide ample evidence that automation has considerable potential for improving the efficiency of securities markets from the point of view of both operational - or cost - efficiency and quality of markets. Technology produces considerable time and cost savings in the operation of securities markets and enhances the visibility, depth and liquidity of markets through its powerful market information and integration effect both at national and international level (4).

Operational - or cost - efficiency of market functioning can be greatly improved through adequate computerisation of processes such as **order** collection, **order** routing, **order** concentration in the price determination process, **order** execution, confirmation, clearing and settlement. The higher the level of automation of these technical/mechanical processes - which traditionally were all carried out manually and of their sequential linkages (avoidance of data re-entry), the higher the time and cost saving effect. This applies in particular to the reduction in, or avoidance of, processing errors which in manual systems may represent a substantial cost factor. The cost saving effect at the level of unit cost will be enhanced further with rising trading volume in terms of number of deals. It should not be overlooked, however, that automation can only be expected to be cost efficient from a certain trading volume upwards and that accordingly low volume markets should either be operated either manually or with low-cost hardware equipment.

While it is recognised that considerable progress has been made, or is being made in the near future, as regards the automation of securities markets it needs to be realised that many market systems are more or less far away from the ideal technical solution of fully integrated, computerised and paper-less systems such as are operating in Denmark and Norway, for example, or as far as derivative markets are concerned, in Germany (Deutsche Terminborse) or Switzerland (SOFFEX -Swiss Options and Financial Futures Exchange).

The quality of markets - as measured by visibility, depth, liquidity and relative price stability can be greatly improved by adequate use of technology in several respects. First, technology designed to enhance the process of dissemination of **market information** (**price information**, volume **information**, company **information**) can, and often does, improve the visibility of markets substantially as **market** professionals and investors can, and do, receive this **information** increasingly on a real-time basis as well as on a wide geographical, even worldwide, basis.

Second, technology can greatly enhance the **market** integration process not only through better **information** but also insofar as screen-based quotation, **order** confrontation, or **price** determination systems no longer require the physical presence of brokers and dealers on a centralised trading floor of a brick and monar" stock exchange. Geographically remote market participants at intermediary as well as at investor level can easily be integrated with a computerised market system that operates on a nationwide basis, and, indeed, has potential for operating on a worldwide basis. In practical terms this means that

countries with traditionally decentralised market structures (i.e. with different local or regional stock exchanges or other fragmented market systems) can, thanks to technology, transform this market structure into a national market system with all the beneficial effects this has from the point of view of **order** concentration, market depth, liquidity and visibility as well as from the point of view of costs, in particular information and arbitrage costs.

It needs to be stressed that securities market technology has the potential for achieving similar market integration effects at international level as is demonstrated by the international linkages of the US NASDAQ market system with the London market and the Singapore market or by the fact that members of the Toronto Stock Exchange can, and do, operate through CATS terminals located in London. The fact that this potential offered by technology is far from being fully utilised as far as the globalisation of regulated securities markets is concerned, has to be viewed in the light of the regulatory uncertainties that prevail in this field as well as of difficulties as regards developing co-operative arrangements between otherwise competing market participants including stock exchanges (5).

Third, securities market technology offers considerable potential for integrating officially regulated and supervised markets with unregulated over-the-counter markets which, in recent years, have seen a strong expansion in most countries as well as at international level. In fact, in fully integrated market systems it does no longer make sense to make a distinction between official markets and over-the-counter markets. If all buy and sell orders for a particular security are channelled through a single market system with complete price and volume visibility it seems obvious that quotations have a much better quality as indicators of the underlying demand/supply situation than prices which are determined on the basis of a small percentage of total transaction volume.

ii) Ensuring the stability and soundness of the financial system

Securities market technology has also considerable potential for making a major contribution to the achievement of the stability and soundness objective of financial policy. This applies essentially at two levels: first, at the level of individual market intermediaries; second, at the level of clearing and settlement systems.

For intermediaries it would be impossible to implement effective risk management on a global and consolidated basis without modem securities market technology or general information technology. Today, major internationally operating universal banks and securities houses have global risk management systems in place, or are proceeding in this direction. Such systems are based on real-time market information permitting an adequate assessment of the various risks inherent in worldwide securities-related activities. From the point of view of policies directed towards strengthening arrangements for safeguarding the stability of the financial system as a whole it would be desirable to explore and exploit the experience gained in this field more systernatically and apply the lessons to be learned to the securities industry as a whole on world-wide basis. In this connection, it would be useful to explore more systematically the potential for an effective risk management of securities firms is offered by an adequate computerisation of clearing and settlement systems. The experiences gained in this particular field in the United States are no doubt be of particular interest (6).

During the October 1987 market break at the latest, it has become evident in quite a number of countries that securities market participants arc not only exposed to price and position risks; there are also considerable counterparty and related liquidity risks that may arise in connection with the clearing and settlement process. Thus, the authorities as well as market participants in a number of countries consider it an urgent task to render the operation of clearing and settlement systems as risk free as possible. The International Society of Securities Administrators (ISSA), the Group of Thirty and the International Federation

of Stock Exchanges (FIBV) have strongly encouraged steps in this direction.

Indeed, available evidence from practical cases suggests that modem data processing and telecommunication technology has the potential for building fairly risk-free clearing and settlement systems for securities and derivative markets. From the point of view of managing systemic risk, "ideal" systems should meet the following requirements:

centralised book-entry system for securities or effective book-entry linkages between decentralised systems;

delivery against payment;

delivery and payment (the system performing the role of the counterparty vis-&-vis each member);

adequate regulation concerning membership;

capital requirements;

current monitoring of position risks;

efficient guarantee deposit system flexible margin requirements, notably in futures and options markets);

centralised monitoring of "large customer" positions.

Given the key position of clearing and settlement systems in national markets for securities and derivatives - all intermediaries operating in these markets (including unregulated markets) need to participate in the clearing and settlement process, directly or indirectly - it seems indeed that an adequate automation of these systems and corresponding regulatory frameworks offer unique potential for the management of systemic risk in these markets and for imposing adequate safety standards on the securities industry as a whole (7).

iii) Maintaining an adequate level of investor protection

Modem securities market technology has unique potential for implementing policies towards an adequate protection of investors against price manipulation and harmful effects of insider trading. in integrated and computerised market systems it is possible thanks to technology, to follow market developments and the trading process minute-by-minute on the basis of mandatory real-time trade reporting. These surveillance systems signal to the market surveillance service of organised markets any unusual price or volume movements thus providing real-time opportunity for intervention both at company level and trading level in **order** to clarify the situation. The most advanced surveillance systems have also techniques in place which permit a systematic examination of the effect of the release of company information on the behaviour of equity prices of the same company before and after the release, which is an important means of identifying cases of insider trading. As all trading information is kept on record ("audit trail") it is also possible to carry out historical research on the behaviour of equity prices. This opens up considerable potential for dealing effectively with cases of insider trading.

It needs to be realised that in many countries the level of automation of securities markets reached so far is far away from ideal market surveillance systems which are made possible by modem technology.

B. Issues for regulation

While the preceding section deals with the question of the scope that automation ideally provides for regulators and policy makers to pursue broad policy objectives in the field of securities market regulation, it is the purpose of the present section to identify and discuss ways and means that are available to regulators for influencing the automation process in the right direction: What are the main issues with which regulators and policy makers are faced in an attempt to steer the automation process in securities and derivative markets in accordance with the objectives and principles of securities market regulation?

It may be helpful for a clarification of the issues involved if the subject is introduced by an overview of the regulation of market automation in the United States.

i) The regulation of market automation in the United States (8)

The regulation of the automation of securities markets and options markets in the United States is based on the Securities and Exchange Act of

1934 (and subsequent amendments). Under the SEC Act, Congress, which assumes ultimate responsibility for the regulation of securities markets in the United States, entrusts the SEC with the task of regulating, inter alia, the automation process in these markets and grants the SEC corresponding powers. The Commodity Futures Trading Commission has a similar role as regards the automation of the markets for commodity and financial futures. A milestone in the history of Congress action in this field was the instruction given to the SEC in 1975 to "facilitate the establishment of a national market system for securities". Congress found that:

"New data processing and communication techniques create opportunity for more efficient and effective market operations"; and:

"The linking of all markets for qualified securities through communication and data processing facilities will foster efficiency, enhance competition, increase the information available to brokers, dealers and investors, facilitate the offsetting of investors' orders, and contribute to the best execution of such orders". [SEC Act, Sections 11A(a)(1)(b) and D)]

It is, however, worth mentioning in this context, that as early as 1963 the SEC noted in the Special Study of Securities Markets (9) the possibility that trading in the over-the-counter markets could benefit from automation and that exchange markets could be improved by the introduction of automated systems. Under its broad mandate to facilitate automation of securities and options markets the SEC requires from all self-regulatory organisations (SROs) such as the stock exchanges and the National Association of Securities Dealers (NASD) that all plans for introducing or changing automated systems are submitted for review and approval. Before approval, or disapproval, of suggestions for the introduction of new automated systems or changes in the existing systems, the SEC publishes the proposal and invites comments from market participants and the interested public at large. Proposals for the introduction of automated systems that have a bearing on market linkages with foreign countries arc also issued abroad for comments. A similar procedure applies to the automation of intermarket linkages within the United States, such as the Intermarket Trading System (ITS) introduced in 1978. These systems require the participation of, and co-operation between, several SROs.

It should be noted in this context that automated systems in securities markets other than those operated by SROs or within the framework of Intermarket Plans are at present not subject to approval by the SEC although, following the experience of the October 1987 market break, the question is under consideration whether, with a view to maintaining efficient, fair and orderly markets at times of unusually high turnover, it is not desirable to monitor such systems as well. This applies in particular to so-called proprietary market systems and to commercialised **order** routing systems that are used by smaller broker-dealer firms which find it too costly to develop their own in-house **order** routing systems. Systems that may be mentioned in this context are INSTINET (owned by Reuters) and POSIT which are automated **order** confrontation systems with some automated **order** execution capability, and ADP, the largest company offering automated **order** routing services.

In reviewing automation projects falling under its approval mandate the SEC generally proceeds flexibly in the sense that it abstains from influencing technology developments in particular directions. Rather, any new projects or changes in existing systems are reviewed in the light of broad principles such as ensuring the safety and soundness - also in an operational sense - of markets, and maintaining adequate investor protection standards and fair, orderly and competitive markets. The systems should not provide opportunity for price manipulation and other unfair market practices. The systems should have sufficient capacity to cope not only with normal **order** flows but also to accommodate substantial surges in trading volume. Under the impact of the dramatic rise in trading volume in October 1987 the SEC inquired into the capacity problem in great

detail and issued recommendations to SROs to increase the capacity of automated systems and enhance their technical reliability wherever deemed necessary in the light of experience. It was in this connection that the SEC introduced in 1989 its new Automation Review Policy ("ARP") requesting the stock exchanges and the NASD to plan formally for their capacity, security, and disaster recovery needs and to obtain independent reviews of their systems' operations. Finally, the aspect of competition and access receives particular attention in the review process. Automated systems should not reduce competition through access constraints or otherwise.

The application of these broad principles may imply detailed checks whether the suggested systems will work in conformity with the rules and procedures which the SROs have in place and whether codes of conduct applying to broker-dealer firms are respected as regards **order** priority, best execution etc. The effects of such systems on price efficiency are also examined.

As regards the question whether and to what extent the SEC acts in a more passive or a more active fashion in dealing with automation issues it seems fair to say that in more recent years the SEC has taken a more active interest in the automation aspects of the securities and options markets and has, in fact, in several instances encouraged the automation process by way of public statements or recommendations which cannot be implemented without a high degree of automation of the processes that are involved (10). One example of this is the recommendation regarding the introduction of basket trading products and procedures and the dissemination of real-time information on programme trading. Another example is the recommendation that specialists should provide real-time information on their limit **order** books; the dissemination of this information is considered by the SEC as particularly helpful at the time of, or prior to, the "opening" i.e. the establishment of the first prices at the trading session, as this would help market participants to adjust to any **order** imbalances that might appear in the limit **order** books at this moment.

ii) Main issues

The present sub-section attempts to identify and clarify a number of issues raised by the automation process in securities markets for regulators and policy makers. Some issues are of a broader nature relating to the desirability of public policy involvement in the automation process in securities and derivative markets and the principles by which any such involvement might be guided; others are of a more organisational and technical nature relating to the actual application and implementation of broader policy principles.

1. The desirability of public policy involvement in the market automation process

In view of the potential that is offered by modem securities market technology for the improvement of the efficiency of markets, for maintaining the stability and soundness of the financial system as a whole, and for contributing to an adequate protection of investors (by assisting in the detection of price manipulation and abuse of insider information), the question for financial policy arises whether the authorities - perhaps as a matter of increasing urgency - should not take a more active interest in the automation of securities markets than has hitherto been the case in most countries (I 1). International organisations such as IOSCO and FIBV increasingly recognise the urgency of the need for regulatory action in this field. The Technical Committee of IOSCO published in June 1990 a report on "Principles for the Over-sight of Screen-based Trading Systems for Derivative Products", which may be seen as one important indication amongst others of the regulatory concerns that are raised by automation developments in both securities and derivative markets (12).

If policy makers - Parliaments, Governments - accept the basic idea that they have ultimate responsibility for an efficient functioning of their countries' financial systems including securities markets and derivative markets, for maintaining the stability of the financial system

as a whole, and for adequate investor protection they cannot, or should not, escape dealing with the automation question. This is particularly true for countries which have adopted an active policy designed to strengthen the international competitiveness of their countries' financial institutions and markets.

Once this basic need for policy makers to deal with the automation issue is recognised the question arises how this issue might be best approached in a given country context. It is obvious that the complexity and the technical aspects of the issues involved require ideally a broadly based participation and expertise in the related decision-making processes and the working out of acceptable and appropriate solutions. In countries with specialised regulatory bodies in the field of securities markets it may be relatively easy to develop an institutional framework - task forces, working groups etc. - for promoting and steering the market automation process. In some country cases with securities commissions it may be necessary that the mandates of these bodies are extended to cover automation issues as well.

In other countries, procedures may be found by which Parliament takes up the basic issue of securities market automation and mandates via legislative action, the corresponding powers and tasks. Denmark is an example of a country which has adopted this approach.

It is also conceivable that countries adopt working procedures similar to those applied in countries such as Australia or Canada in the field of payments systems. It should be noted in this context that the organisation and management of payments systems also involves important decisions on automation. In Australia, the Government set up in 1984 the Australian Payment System Council as a non-statutory body whose mandate it is to monitor the development of domestic payments systems and promote electronic fund transfer systems and their effective interconnections. In Canada, co-operation in the development of payments systems on a nationwide basis was legally imposed by the Canadian Payments Association Act of 1980 which mandated the Canadian Payments Association (CPA) to establish and operate a national clearing system and to plan the evolution of the national payments system 13).

A most interesting procedure for dealing with urgent questions of automating clearing and settlement systems in securities markets has been suggested by the Group of Thirty in its recent report on Clearance and Settlement Systems in the World's Securities Markets. It remains to be seen whether, and to what extent, this important private initiative receives the necessary support from the authorities, self-regulatory organisations and professional organisations of the banking and securities industry (14).

2. Main principles applying to the development and management of automated securities market systems

Once the mandate and the institutional framework for dealing with issues of market automation are in place in a given country context the question arises by what basic principles decisions or proposals in this field should be guided and which of the several processes that lend themselves to automation should be covered by the decision making processes. Ultimate guidance is, of course, provided by the basic goals of financial policy such as efficiency (ensuring an adequate and safe functioning of markets), stability, safety and soundness of the system as a whole (containing systemic risk), and investor protection (fair and equitable treatment of investors). For applying these broad policy considerations to practical solutions it is certainly necessary to become more specific in what is meant by efficiency, the stability and safety of the system as a whole, and adequate investor protection, and what in detail is required in terms of automated system characteristics to meet these objectives.

The efficiency criterion could be seen as relating to the following aspects of automated systems: adequate capacity, technical reliability of functioning, operating cost, **market** coverage (which is relevant for the **price** determination process, **market** depth and liquidity),

market visibility (adequate and timely **information**),
competition aspects (degree of openness as regards system access).

The relationship between efficiency and competition is a very important question in this connection. Most countries have in recent years adopted a market-oriented approach in financial policy as well as in other areas of structural policy. Thus, reliance on competition and the working of market forces has become a major policy tool used for improving efficiency. It needs to be realised, however, that efficiency and competition are not identical objectives. Competition is not an end in itself-, the ultimate objective is efficiency, not competition. In some areas, co-operation is certainly a better approach to dealing with efficiency questions than reliance on competition. One of these areas is precisely the building of the technological infrastructure of the financial system covering the payments system, the telecommunication network and automated securities market systems including clearing, settlement and depository systems. The building of competing automated trading, information, clearing and settlement systems without co-operation aim at making any such system mutually compatible and accessible, would clearly result in tremendous efficiency losses for the financial community as a whole. While larger countries may be able without efficiency loss to rely in this regard on a network of effectively interlinked, but nevertheless competing, systems it is for smaller countries clearly an advantage from an overall efficiency point of view if there is one centralised telecommunication network, one centralised market system, and one centralised clearing, settlement and depository system for securities. As far as clearing and settlement systems are concerned, the recommendations of ISSA, the Group of Thirty and the International Federation of Stock Exchanges go all in the same direction (15).

The importance of co-operation in this field designed to enhance cost efficiency was some time ago highlighted by the declared intention of the Chicago Mercantile Exchange and the Chicago Board of Trade to co-operate in the field of building a global trading system for financial futures and to merge in one way or another their originally competing projects GLOBEX and AURORA (16).

As far as the other two basic policy objectives are concerned - systemic stability and safety and investor protection - the checklist" for developing, or examining, automated systems may include as broad guiding principles references to adequate safety arrangements on the one hand and fair and equitable markets on the other.

From a systemic stability point of view one broader guiding principle for setting up automated clearing and settlement systems should be the availability of adequate safety and risk control capabilities, notably as regards financial futures and options markets in which clearing houses operate as ultimate guarantors of the contracts traded in the market system (17).

The criterion of equitable and fair markets would cover aspects such as equal opportunity for investors, borrowers and intermediaries to have access to the various automated facilities that are available in the securities markets. The criterion of fairness would, inter alia, relate to the fair treatment of client orders with regard to **order** priority
and pricing best execution principle).

A major point on the "checklist" under the heading of investor protection would be the availability of comprehensive trade reporting systems ("audit trails") which would enable SROs to exercise adequate market surveillance with a view to detecting at an early stage irregular trading patterns and would allow regulators to conduct inquiries into historical trading detail (storage facilities for trading data).

3. Automated trading systems

As stock exchanges and other regulated market systems are moving forward towards developing automated or computer-assisted quotation, **order** execution and trading systems and exploring ways and means of setting up international trading linkages - brief mention may be made of

NASDAQ International and GLOBEX in this latter context - an increasing need is felt for developing regulatory frameworks for such inter-market system developments. Numerous questions may be raised in this context. Should the choice of trading modes to be adopted in such systems be left to the SROs? Should proprietary trading systems such as INSTINET fall within the scope of any such regulatory frameworks? Should quotation dissemination systems which are not registered as SROs be considered as market systems that should fall within the scope of market regulation?

As regards trading modes there are at present two basic systems in operation as far as automated off-floor systems are concerned: the continuous auction system which operates on the principle of a public limit **order** book in which orders that match in size and price are executed automatically; and market maker systems in which competing market makers continuously **quote ask** and **bid** prices at which they are prepared, or obliged, to trade or negotiate in reasonable or specificised amounts. If quotations are binding under existing market rules, trades up to specified amounts may be executed automatically in some cases. If quotations are indicative, there is further scope for price negotiation via telephone or other telecommunication means.

There seems to be increasing awareness and recognition that different market segments require different trading modes and that markets as a whole would lose in flexibility if only one single and uniform trading system would be imposed on them. Markets in a few instruments with high turnover and fast moving demand and supply conditions and price expectations - markets for government securities, for some futures and options contracts, and for the shares of the internationally traded multinational companies are cases in point - require other trading techniques than small-turnover shares including unlisted ("pink sheet") securities. Block trading and other wholesale trading operations require other price negotiation techniques than the price setting procedures applying to retail markets.

While the **order** book technique - with price and volume, or volume-only indications - may be an appropriate approach to signalling to the market certain buying or selling intentions in low turnover securities, quotation display systems are generally considered to be more suitable for fast moving markets which require quick price adjustments by market makers. A typical example of this latter type of market is the foreign exchange market. Thus, regulators and SROs are faced with the question of how to accommodate these various market requirements as far as different trading modes are concerned. Is it technically feasible to operate different trading modes on one system? It seems that the new system of the Copenhagen Stock Exchange provides an affirmative answer to this question. Alternatively, is it preferable to operate parallel systems with high speed and volume professional trading being separated from the traditional price fixing process? Such an approach has been adopted in the Netherlands.

It could be argued that the working out of solutions to these problems should be left to the market operators and the SROs which are involved. Against this may be held that regulators, under their investor protection mandate, need to be concerned with the way in which prices applying to the small investor in particular are determined by the market. To what extent should the different components of total demand and supply for the securities in question - institutional, retail, intra-market demand and supply - be channelled into the visible price determination process? How should large amounts of retail orders be handled in this regard, notably if such orders take the form of market orders (i.e. orders without price limits)? To what extent should market operators - banks or securities houses - be obliged to route such orders individually through the market system irrespective of the costs involved? If the bundling of retail orders were allowed, at what time should these orders go to the market, at the opening of the next session or at certain hours during the same-day session? If banks and securities houses were allowed to fill retail orders from their own books, what prices should be applied? Governments which pursue the financial policy objective of promoting widespread share

ownership in their country will no doubt wish to pay particular attention to these questions. They will also wish to see to it that efficient automated systems for the handling and routing of retail orders are in place and will encourage the development of systems in this direction (18).

While the questions concerning trading modes and rules just discussed are of a more general nature and are not directly related to the automation process, it would nevertheless seem desirable or necessary that, in planning automated systems, regulators and SROs take a fresh look at these questions, all the more so as automation opens up hitherto unseen possibilities for the creation of fully integrated markets i.e. for merging traditional off- and on-exchange markets, or for effectively integrating hitherto separately operating regional stock exchanges into one nation-wide market system.

A closely related issue pertaining to the development of automated trading systems is the question of control over the operational terminals through which trading - competitive price bidding, exposure of orders and eventually automated **order** execution - takes place: Who should be authorised to have access to the terminal network? What conditions should apply to the admission of terminal operators? This question becomes all the more relevant as traders are no longer bound to be physically present on a centralised trading floor. One particular aspect of this question is whether institutional investors should be allowed to have direct access to the trading system; and, in the affirmative, under what conditions?

To the extent that the members of market systems are subject to special admission and operating conditions ("fit and proper text", capital requirements, special risk management and supervisory requirements) it would be fair and equitable if the same conditions were to apply to institutional investors applying for direct access to the trading system as well. For supervisory reasons it would perhaps be preferable in such cases if institutional investors were required to set up separately capitalised subsidiaries which would become members of the trading system and - most importantly - of the clearing and settlement systems as well (with all the risk management arrangements in place which membership in the latter systems may require).

Two further issues relating to automated trading systems seem worth mentioning as being of interest from a regulatory point of view: first, the procedure and formula used for establishing the opening price in an **order** confrontation - or auction - market system such as CATS; second, the scope for pre-arranged **order**, or quotation, input.

It seems that in developing automated auction systems the question of how to establish the opening price for each security at the beginning of each trading session requires particular attention, as at this moment in time major market operators could be tempted to move the market into a desired direction via last-second pre-opening **order** input (19). As has already been indicated, the establishment of the opening price is important for filling market orders that have been collected between two trading sessions. In developing automated auction systems regulators thus need to examine carefully whether and to what extent opening price procedures provide scope for price manipulation.

Similar concerns relate to the possibility that the mandatory use of automated trading systems could lead to a certain practice of pre-arranged **order**, or quotation, input which may be intended to move the market in a desired direction. The argument is sometimes heard that automated trading techniques could not really force market participants to stop trading over the telephone. In encouraging the development of automated trading systems and setting up corresponding regulatory frameworks regulators need to take this possibility into account.

4. Market visibility

As modem data processing and telecommunication technology provides a unique opportunity for enhancing market visibility through real-time market information giving extensive trading detail, the question arises for regulators how this potential should be actually used for market

functioning and investor information purposes and to what extent, and how, the dissemination of market information should be made subject to regulatory requirements. Conceivable guiding principles in this regard could be:

equal opportunity for all market participants to access real-time market information;

adequate real-time quotation and "last trade" reporting;

limit **order** book disclosure.

While there is no doubt that these principles can technically be implemented through appropriate automated systems, it is in many instances controversial whether such a degree of market visibility has ultimately a favourable effect on the functioning and the structure of markets, or whether technical arrangements that are necessary to achieve this level of market visibility can be imposed on the market without meeting major resistance from market operators. For example, in a market maker system the requirement of immediate "last trade" reporting can create situations in which individual market makers can be squeezed by their competitors into inescapable loss positions, which ultimately may lead to an unacceptable business failure record or a related concentration process in the securities industry.

Another controversial question is whether block trading detail should be covered by the last trade reporting requirement as prices applying to special large volume transactions could strikingly deviate from prices established by the regular price determination process in the market. To what extent would the emergence of such price differences matter from the point of view of fair and equitable markets?

As far as limit **order** book disclosure is concerned it is important to note that a major difference between a market maker system of the NASDAQ or SEAQ type, and an **order** confrontation system of the CATS type, indeed concerns this particular point. While CATS type systems operated at the stock exchanges of Toronto, Paris, Brussels, Madrid, Rio de Janeiro, Taipei, Kuala Lumpur, Australia etc. practically work on the principle of a disclosed limit **order** book, such information is usually not available to participants in a market maker system. If in the latter type of system, market makers were required to report their limit **order** books to the system, which in turn would combine this information so that the system as a whole would display an integrated limit **order** book for each share, market maker systems and **order** confrontation systems would indeed become very similar. Indeed, it can be argued that in market maker systems finn i.e. binding quotations applying to specified amounts which market makers display on their terminals have essential characteristics of a limit **order** book.

5. Market integration

As modem securities market technology provides unique potential for the integration of geographically or institutionally separated markets, regulators or policy makers, guided by the objective of creating efficient markets, have a strong reason for considering this issue from a regulatory point of view as well. The market integration capabilities of automated market systems are well demonstrated in Australia and Denmark, not mentioning the well-known case of the NASDAQ market in the United States. In Australia, automation has been instrumental in linking the six regional stock exchanges together to form the Australian Stock Exchange which operates as a single system. In Denmark, automation has led to a full integration of the formerly very large over-the-counter, or telephone, market with the Stock Exchange so that a distinction between these two market areas has indeed become meaningless.

In the United States, market integration, in addition to the creation of the NASDAQ market, has been progressively achieved by the introduction of three essential automated systems:

the Consolidated Transaction Reporting System (1974);

the Consolidated Quotation System (1978);

the Intermarket Trading System (ITS) (1978).

While the first two systems are real-time information dissemination systems which by themselves have already a considerable market integration impact in respect of the securities traded in several regional stock exchanges (inter-listed securities), the third system also provides **order** routing capabilities which enable brokers to execute orders for inter-listed securities flexibly and expeditiously at best prices in the inter-linked market system which comprises all stock exchanges - NYSE, AMEX, BSE (Boston exchange), CSE Cincinnati exchange), MSE (Midwest exchange), PhLX (Philadelphia exchange), PSE (Pacific exchange) - and the NASDAQ market.

In planning measures designed to achieve greater market integration through an appropriate use of technology, essentially two options appear to be available depending on the level of automation that is to be found acceptable by the securities industry. A basic decision in this regard is whether floor trading is to be maintained or whether the securities industry is prepared to move to a fully computerised trading system altogether. In the first case, assuming that in a particular country - or area - several regional stock exchanges operate side by side, a minimum requirement for achieving a noticeable integration effect would be the introduction of a combined automated real-time quotation dissemination system combined with an **order** routing system which could be modelled on the United States Intermarket Trading System (ITS). Automation in such a link-system could be further enhanced by the introduction of automated floor systems for **order** confrontation, matching and execution systems similar to those used at the New York Stock Exchange or at the Tokyo Stock Exchange. However, the link-system just described would practically provide no scope for integrating OTC markets with the stock exchanges unless the use of stock exchanges were made mandatory.

A more comprehensive market integration could be achieved by a changeover to a centralised and fully computerised market system which would make it possible for geographically remote operators to participate in the system. As has already been indicated, such systems could not only cover formerly separated OTC markets; they could also - technically speaking - accommodate worldwide cross-border membership.

Cross-border participation in automated securities trading systems raises, however, a number of regulatory issues which are just at the beginning of a - probably very lengthy - process of clarification. In the remainder of this Section an attempt has been made to identify some of these issues.

A major regulatory issue pertaining to automated cross-border trading systems would seem to be how to regulate and supervise the users of the operational terminals of any such systems: Who should be authorised to trade via system terminals? What conditions should apply to non-resident membership in the system, i.e. to terminal users that are located in foreign countries? How could any such foreign terminal operators be effectively controlled by the regulators of the market system's 'home' country?

An approach which would seem to require least regulatory adjustment and international co-operation between national regulators could be seen in applying the condition that foreign participants need to have a corporate presence in the market system's home country, for example, in the form of a wholly-owned subsidiary which, formally and legally, would become a member of the system and would thus be subject to all membership requirements, obligations and liabilities like any other resident, or national, member. In this way, the regulators of the market system's home country could be sure to have full control over any foreign member even if terminals were located in the foreign member's parent company domiciled in countries other than the market system's home country. Basically, it would seem that this approach is being planned in connection with the development of GLOBEX, the joint venture of the Chicago Mercantile Exchange (CME) and Reuters, which will be linked with the Sydney Futures Exchange and the MATIF in France once the system becomes operational. SEAQ International in London may also

be seen as being based on this principle although SEAQ International terminals are at present only in a few exceptional cases placed outside the United Kingdom with affiliated companies of London-based members of SEAQ international).

While this approach may satisfy the regulator of the market system's home country, the question needs to be asked how the regulators of the host countries in which the terminals of any such cross-border trading systems of other countries are to be located, should respond to such system arrangements. Presumably, host country regulators will wish to subject the placement of terminals of other countries' market systems at least to authorisation procedures, if not to bilateral agreements with the regulator of the market system's home country. This seems to b,-, indicated by the way in which some national regulators have responded to the GLOBEX project.

The regulatory aspects of cross-border trading systems become more complex if such systems are designed - as in the case of GLOBEX for example - to link, for cross-border trading purposes, two or more national market systems. In this case, it seems indeed indispensable that the regulators of the two market systems' home countries do co-operate and conclude a corresponding market system agreement which clarifies the regulatory border lines between the two market systems. It is, however, conceivable that both market systems maintain their special national characteristics, provided that it is specified in the agreement how the dividing line between the two market spheres is going to be drawn. In the case of financial futures markets this may be a relatively easy task because of the relatively small number of instruments traded, as markets could be separated according to instruments while in the case of equity trading, notably if inter-listed securities are involved, the separation of market spheres may be more difficult if not impossible. An effective separation of market spheres would also require that each inter-linked market system would have two groups of system members: those who have a corporate presence in the other market system's home country and are thus able to operate in either system; and those who can only operate in their own home country's market system.

An alternative approach to dealing with the regulation of automated cross-border market systems would consist of the solution adopted within the EC in connection with the creation of the 1992 unified market for financial services and would thus be based on two principles: mutual recognition of national regulatory systems and home country control. It is obvious that such an approach would need to be based on a minimum level of harmonization of essential features of regulatory systems. Applied to regulatory issues pertaining to automated cross-border market systems the mutual recognition/home country control approach would presumably mean that each automated stock exchange within the unified market area would accept cross-border membership without any additional authorisation procedures, i.e. trading terminals could be placed all over the unified market area, and each national market system would rely essentially on home country control in respect of authorisation procedures and prudential regulation and supervision applying to broker/dealer firms (i.e. stock exchange members), while compliance with "codes of conduct" would naturally have to become subject to host country control. As far as membership from outside the unified market area is concerned, it is conceivable that the first regulatory approach - corporate presence within the area of the market system - would be a most appropriate approach.

A final regulatory issue which may be raised under the heading of market integration relates to the question of how to regulate the admission of securities and derivative products to automated cross-border trading systems. In this regard, conventional regulatory approaches seem to find themselves in a certain dilemma. Traditionally, the admission of securities to official quotation and listing has been subject to precise and often demanding listing requirements. On the other hand, thanks to efficient information dissemination systems operated by private information vendors, and thanks to efficient telecommunication links between all financial centres, there has been a tremendous expansion in international

over-the-counter trading in equities and other securities in response to investor needs and trading opportunities. It is obvious that this international OTC trading activity, like any other trading activity in securities, money and foreign exchange markets, lends itself to computerisation in one form or another. SEAQ International in London or INSTINET may be seen as examples of this. Other systems may be under consideration or preparation. If regulators were to apply conventional admission-to-quotation requirements also in the case of international OTC trading, markets would surely find ways around such requirements although at the price of efficiency losses. A certain compromise could consist of admitting only those securities to the international trading system which have gone through the admission-to-quotation process at recognised national stock exchanges. This latter approach would presumably be based on the assumption that today the principal stock exchanges in the world, thanks to their co-operation within the framework of the International Federation of Stock Exchanges (FIBV), apply approximately comparable admission standards.

NOTES

1 The financial policy objective of safeguarding systemic stability has been substantially upgraded in recent years following the market breaks of October 1987 and October 1989 and the collapse of Drexel Burnham in 1990. Accordingly, considerations relating to systemic risks, i.e. risks for the financial system as a whole, have received increasing attention in recent national and international discussions on securities market regulation in general and regulatory issues pertaining to the automation of securities markets in particular. For more detail see the following documentation:

a) Organisation for Economic Co-operation and Development (1991), Systemic Risks in Securities Markets, a report prepared by the OECD Ad Hoc Group of Experts on Securities Markets;

b) Ketchum, Richard G., Regulatory Challenges for the 1990's, remarks before the Federation Internationale des Bourses de Valeurs, Geneva, Switzerland, 17th-18th April 1991;

c) Chapman, Alger B. "Duke", International Securities Regulation in a Global Electronic Environment, remarks before the Federation Internationale des Bourses de Valeurs, Geneva, Switzerland, 17th-18th April 1991;

d) Rhee, S. Ghon, Systemic Risks in Securities Markets of Six Asian Economies, paper presented at the Informal OECD Workshop with the Dynamic Asian Economies on "The Organisation and Regulation of Securities Markets", hosted by the Monetary Authorities of Singapore on 6th-7th May 1991 (to be published by the OECD under the title: Dynamic Asian Securities Markets).

2. In the United States, federal securities laws require the Securities and Exchange Commission (SEC) to protect investors and to foster fair, Orderly and competitive markets. See: Remarks of David S. Ruder, Chairman, United States Securities and Exchange Commission, before the Annenberg Washington Program 1989 Forum on Technology and Financial Markets, Washington, D.C. 27th February 1989, Automation of information Dissemination and Trading in U.S. Securities Markets, page 20.

3. See: Mandate of the French Socurities Commission ("Commission des Operations de Bourse").

4. At a Workshop held by the FIBV Federation Internationale des Bourses de Valeurs), Mr. R. J. Schoer, National Director, Companies, Australian Stock Exchange, enumerated the following advantages which, from an efficiency point of view, automated market systems have as compared with non-automated floor systems:

life "real time" market quotations;

immediate and full details of- all trades;

visibility of depth of the market;

instantaneous matching of bids and offers;

immediate dissemination of information;

a robust audit trail;

capacity to handle large volumes of business without stress;

equality of opportunity for broker members of the Australian Stock

Exchange (ASX) to participate no matter where they are located in Australia;

facility for electronic communication among operators;

instantaneous communication on screen between brokers no matter where they are physically located;

facilities for open ended trading hours.

Sources of errors and delays in manual systems which are avoided by automated systems were enumerated as follows:

verbal and hand written translation of orders from the offices of broker members to the floor operators;

Chalkies" translation of audible price call by operators;

operator making out transaction slip;

placement of transaction slip on the conveyor belts;

input of sale by keyboard operator on the trading floor input by production staff of the information contained on the sales slip;

no direct negotiation among brokers on different trading floors.

See: R.J. Schoer, Benefits and Self-regulation Provided by the Stock Exchanges, remarks before the Federation Internationale des Bourses de Valeurs, Geneva, Switzerland, April 17-18, 1991.

5. See also Section 11 of the present paper which refer to some practical examples of cross-border market integration errorts and experiments.

6. See, for example, Roger D. Rutz, Clearance, Payment and Settlement Systems in Futures, Options and Stock Markets, Board of Trade and Clearing Corporation, 24th February 1989, Section on Financial Components of Settlement Systems.

7. In the United States, the CME Clearing House (i.e. the Clearing House of the Chicago Mercantile Exchange) is currently developing a number of risk management systems. These programmes could, inter alia, allow the Clearing House and its members to track position risk at both the individual account and clearing member levels. See: Commodity Futures Trading Commission, Division of Trading and Markets, Chicago Mercantile Exchange's proposed GLOBEX Trading System, 2nd February 1989, page 72.

8. The overview is based on information contained in the paper by David S. Ruder and Alden S. Adkins Automation of Information Dissemination and Trading in U.S. Securities Markets), annex to the paper mentioned in Note 2.

9. Report of Special Study of Securities Markets of the Securities and Exchange Commission, 88th Congress, House Document 95, Parts 1-5, U.S. Government Printing Office, Washington 1986.

10. See, for example, the paper by David S. Ruder and Alden S. Adkins (Automation of Information Dissemination and Trading in U.S. Securities Markets, pages 23 to 29), annex to the paper mentioned in Note 2. See also Note 11.

11. See: United States Securities and Exchange Commission, Policy Statement, Regulation of International Securities Markets, Washington, November 1988. The Policy Statement stresses in various instances the importance of automation for increasing efficiency and stability in worldwide securities markets.

12. See: The Technical Committee of the International Organization of Securities Commissions, Principles for the Oversight of Screen-based trading Systems for Derivative Products and Screen-based Trading Systems for Derivative Products, IOSCO, Montreal, June 1990.

13. For some further detail see: OECD (by G. Braker), Competition in Banking, Paris, 1989, Section 3.8, Streamlining the Payments Systems.

14. Group of Thirty, Clearance and Settlement Systems in World's Securities Markets, New York and London, March 1989. In the Steering Committee's Preface it is said that: "In conclusion, each of us - individually and collectively - urges that participants, practitioners and regulators embrace these proposals and incorporates them as a fundamental kernel in the plans for change and modernisation that exist in virtually all of the world's securities markets." Each of the nine Recommendations in

the G-30 Report, in fact, contains a target year in which the Recommendation in question should be implemented, and in the Conclusions following the Recommendations the Report states that "In many markets, there may be no possibility of meeting the target dates unless a phased plan for implementation is agreed upon by the end of 1989".

15. See the following documentation:

a) ISSA 4 - Recommendations on Clearing and Settlement Systems, issued by ISSA International Society of Securities Administrators) at its Fourth International Symposium, held from 16th to 19th May 1988 in Switzerland; b) Group of Thirty, Clearance and Settlement Systems in the World's Securities Markets, New York and London, March 1989;

c) Federation Internationale des Bourses de Valeurs (FIBV), Improving International Settlement, Report by the Task Force Appointed by the FIBV, June 1989.

16. See, for example, Deborah Hargreaves, "A breath of unity in Windy City", Financial Times, 31st May 1989. The article comments on the co-operation agreement between CBT (Chicago Board of Trade) and CME (Chicago Mercantile Exchange) concerning electronic trading plans which was concluded in May 1989, as follows: "Chicago's two futures exchanges had faced a strong body of opinion among their members that a joint system would be cheaper, more efficient and easier to use."

17. See paper by Roger D. Rutz (Clearance, Payment, and Settlement Systems in the Futures, Options and Stock Markets) mentioned in Note 6.

18. In France, for example, where small orders account for a relatively high proportion of transaction volumes in securities markets, banks with extended **order** collection networks are making considerable efforts to develop efficient in-house **order** routing systems for small **order** handling. See, for example: Luc Andre, Computer-assisted continuous trading: a reality for all clients, presentation at Rencontres Internationales de la Bourse de Paris 1989, 4th-5th January, Paris.

The subject of efficient retail equity markets has also received special attention in the United Kingdom as fostering widespread equity ownership has been a declared policy objective for a number of years in connection with the Government's privatisation programme which involves the flotation of large amounts of equities of the privatised firms.

19. Opening price procedures received special attention when automated **order** matching and execution systems were introduced at the stock exchanges of Paris, Australia and Vancouver. At the Australian Stock Exchange it has been found useful to reduce the scope for last second **order** input designed to influence the opening price by using discretionary deviations of plus or minus one minute or so from the official opening time.

In the review of the Chicago Mercantile Exchange's proposed GLOBEX Trading System by the CFTC the opening price procedure received also special attention.

[Tabular Data Omitted]

Industry Codes/Names: BANK Banking, Finance and Accounting
Descriptors: Automation--Economic aspects; Stock-exchange--Automation; Financial markets --Automation; Securities law--Interpretation and construction; Securities industry--Laws, regulations, etc.
Product/Industry Names: 6211 Security brokers and dealers; 6231 Security and commodity exchanges
File Segment: TI File 148

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Program trading of equities: renegade or mainstream?

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Text:

Program trading gained a bad name after the 1987 stock market crash. But it is here to stay with new products coming out all the time.

The strategy of portfolio/program trading of lists of securities simultaneously has been around for some 15 years, but only in the last few has it generated interest and controversy Program trading currently constitutes about 10 percent of a typical day's volume on the New York Stock Exchange and is most commonly used by large institutional money managers, pension funds, and their broker/dealers. Fulfilling many of the same needs as portfolio trades, futures on U.S. stock indexes were introduced in 1982 and now trade a dollar amount of equity value each day about 125 percent of the amount traded on the NYSE. New portfolio trading vehicles have been or are about to be introduced before the end of this year-specifically, Exchange Stock Portfolios and Market Basket Securities which will offer a market for exchanging S&P 500 portfolios as units operated by the NYSE and CBOE.

The controversy surrounding program trading has arisen primarily because of a clash between traditional stock trading as conducted by exchanges and the portfolio approach to investment undertaken by the large institutions over the last decade. Many of the strategies that fit with the objectives and scale of institutional money management, such as indexation, quantitative screening of lists of stocks, asset allocation, portfolio insurance, return-enhancing futures arbitrage, and inter-country portfolio shifts, are most efficiently executed with portfolio trades. Even more compelling to money managers and their ultimate customers is the fact that portfolio trades typically cost one-half what traditional trades cost. Transacting with index futures can reduce costs even further, to 10-20 percent of the cost of a traditional stock trade.

THE COMMODITIZATION OF STOCK MARKETS

Goods and capital have been flowing across borders at an accelerated pace, while the economic prosperity of the 1980s has greatly expanded the value of global stock markets over the last seven years. Current communications technology allows investment information to be transmitted immediately to trading rooms on the other side of the globe and permits investors to act on this information very quickly. The result is the release of new economic statistics or movements in currencies transmitted into the prices of other financial assets more quickly Since futures trading presents a forum for concentrating liquidity with competitive market making, markets in which futures are traded are often the first to

react to new developments affecting the values of all equity or fixed-income securities denominated in a particular currency.

Advances in investment theory over the last 25 years have concluded that the risk of a portfolio's general equity market exposure should be separated from the risk of specific stock holdings for purposes of portfolio construction, risk management, and performance evaluation. Portfolios should meet the objective of achieving the greatest risk reduction for a given return level. Such portfolios tend to be well-diversified, often resemble market indices, and thereby effectively view the stock market as a commodity. One-quarter to one-half of the performance of a typical stock can be attributed to movements in the overall market. For a diversified equity portfolio, more than 90 percent of the returns can usually be explained by changes in the general level of a market index.

The first effect of this "Modern Portfolio Theory" has been the acceptance of passive or index management by pension funds and other large institutional investors. If a large portion of returns of equities is a function of overall market factors, it seems to make sense to allocate a portion of an equity portfolio to index management. This is especially true if passive management can be implemented at a much lower cost than active stock selection services. As of the end of 1988, indexed equity assets at money managers surveyed by Pension and Investment Age were $137 billion. Internally managed index funds at pension sponsors easily bring this figure to over $200 billion.

The indexed portions of institutional portfolios, along with futures on those indexes, have in turn become the means through which investors shift among asset classes such as stocks, bonds, and cash. This latter decision, the asset-allocation decision, has been shown to be of critical importance to overall performance and is now often treated separately from the selection of particular issues of stocks or bonds. Retail or individual investors, who have become comfortable with money market funds and bond mutual funds, have also begun to appreciate the import of this critical decision in which the equity portion of holdings is, in fact, treated as a commodity. The availability of international investment vehicles has expanded the range of choices and diversification opportunities for both individual and institutional investors. The impact of the growth of interest in asset allocation and the range of vehicles with which to trade asset classes has had the effect of layering the investment-management process. At one level stocks are considered an asset class or commodity and defined in terms of indices. At another level they are differentiated from one another and compared based on price versus value and appreciation opportunity

The second effect of the application of Modern Portfolio Theory to investment management has been to change the way in which stocks are analyzed and compared to one another. Those aspects of a particular equity issue specific to that company, not related to the overall market, are both of most importance in analysis and the basis for inclusion of that stock in a portfolio. Quantitative approaches to stock selection have become more widespread. In these approaches stocks are compared based on valuation of anticipated cash flows, consistency of earnings growth, and other objective measures. The result of this process is a list of issues to buy and sell periodically that can at times be most efficiently handled via a program trade. Other applications involve index funds with slight tilts or increased weights in "cheap" issues at the expense of lower weights in issues deemed overvalued through some analytical process. These portfolios are often close enough to index holdings to be executed as program trades.

APPLICATIONS OF PORTFOLIO TRADING TECHNIQUES

Before discussing the specific means by which portfolio trades can be accomplished either directly or through derivatives, we will identify some of the aspects of the investment management process in which these trading techniques have proven to be most effective. Figure 1 lists the applications of portfolio and index derivative trading for institutional

investors and broker/dealers. For institutions, this form of trading has been conducted in the process of managing the overall fund or pension plan as well as within the specific stock or cash segment of the fund. In addition, portfolio trading, despite its image of appealing primarily to passive or index managers, has begun to play a role in the actively managed segment of the stock portfolio.

Asset Mix Management

At the overall fund level, portfolio trading and index derivatives are most widely used for adjusting the asset mix to changing performance expectations for asset classes or country exposures. For example, a shift from bonds to stocks can be accomplished with Treasury bond and stock index futures or with portfolio trades, thereby increasing the amount held in stock index funds and selling a portion of a bond index fund or the liquid Treasury securities. Another common application would be the use of a portfolio trade to shift from the Japanese stock market to the U.K. stock market by selling stock baskets constructed to replicate a Japanese market index such as the Nikkei 225 and purchasing a U.K. stock index portfolio. Index trading is also used to maintain target asset weights, as relative changes in asset class values cause aggregate stock and bond holdings to drift away from target levels.

The choice between stock portfolio trading and derivative securities for asset class shifts depends on several factors. Tactical or active asset allocation, which attempts to exploit short-term pricing opportunities across markets, is often best implemented with futures. Strategic asset shifts expected to be in place for one year or longer should be implemented in the underlying market with a portfolio trade, thus avoiding the cost of rollovers of futures positions every quarter. Futures have the advantage of enabling the asset mix management to be used in conjunction with the stock, bond, and cash management. Each process can then be handled by a different party, performance measurement can be separated, and more expensive stock trading can be confined to turnover motivated by stock-specific considerations.

Portfolio Insurance

Portfolio insurance implementation is also facilitated by portfolio trading and the use of derivatives. In practice, the trades associated with this strategy are in the same format as asset mix trades except that index options become more important in the execution mix. Since portfolio insurance aims to protect aggregate equity values in an equity market decline, it views the equity portion of the investment portfolio as a commodity. The exposure to the declining market is reduced as prices fall through the selling of assets being protected with futures hedges, by portfolio trades, or by increases in the value of a put option representing the right to sell that equity portfolio for a fixed price. More sophisticated applications of portfolio insurance involve protecting the value of either the spread of pension assets over liabilities or of an equity portfolio denominated in a currency other than the base currency of the component stocks. From the perspective of trading requirements, these other applications are similar. They differ, however, in the circumstances surrounding the value change that triggers the portfolio or index derivative trade.

Applications in Portfolio Administration

Fund administrators also find portfolio trading and derivatives handy when they need to deal with structural changes in their funds or handle large cash flows. Investment managers are shifted, portions of plans or whole plans are terminated, and large pools of cash need to be added or withdrawn. Two things are critical in these types of operations: first, the change needs to be accomplished with minimal disruption to the asset mix; second, the change should be conducted in the most cost-effective manner. With portfolio trading, a stock portfolio can be sold and another repurchased within a day; futures can also be used while stocks are being shifted. The pure commission and market impact cost is often less than half of what would be incurred if stocks were handled individually. In addition,

stock trades may take days to implement, over which time performance would be sacrificed on funds held in cash.

Derivatives work particularly well for keeping cash positions at a minimum for large investment portfolios. Cash holdings arising from the normal flow of daily stock transactions can be "equitized" by purchasing index futures representing the aggregate dollar amount of cash balances held. Money managers can thus efficiently maintain fully invested positions.

Passive Equity Management

Portfolio trades are the bread and butter of index fund management, as well as one of the reasons the fee structures for this type of management are so low. Passive management is also growing in other major equity markets. The amount of index investment in Japan is believed to be in the neighborhood of $25-40 billion and growing rapidly. These funds (after subtraction of management fees) typically perform within .25 percent of their target index, taking into account the reinvestment of dividends. The management of index funds primarily revolves around handling cash inflows and outflows, such as dividends, withdrawals, new inflows of funds, and changes associated with restructurings, stock tenders, and index additions and deletions, in an orderly and low-cost manner.

Separate index fund products have been created to exchange index tracking error for enhanced returns. In one application, index fund managers engage in arbitrage between stock index futures and the index portfolio, depending on which is more attractively priced. These enhanced index fund strategies have added from 1 to 3 percent in incremental returns to those generated by indices over the last several years. In addition, this arbitrage between cash and futures markets keeps pricing relationships between futures and stock markets linked. Other enhanced return products for index-based funds that use portfolio trades overweight and underweight certain issues slightly to take advantage of price/value opportunities as identified by some quantitative model. These strategies combine active and passive management but position themselves more closely to index funds.

Active Equity Management Applications

Active equity managers are hired because they promise to outperform an index or other performance benchmark in return for a higher management fee than that collected by passive managers. Many of these managers use computer-based portfolio screening and evaluation techniques to compare the many investment opportunities available to them in equity markets. The result is a periodic list of stocks to buy and sell. When they trade these issues, the managers would like to realize a price as close as possible to the price on which the evaluation was based and coordinate the dollar amounts involved in the sale of one set of securities and purchase of another. These active managers utilize portfolio trades to accomplish their disposal and acquisition of issues. Many have also tried stock swapping services such as Instinet and Posit, which are stock **order**-matching services that attempt to match buyers and sellers off-exchanges for low commissions.

Recently, active managers have begun to participate in the market-making function often conducted on broker/dealer block desks. Lists that one manager wants to buy or sell are shown by the broker to other managers who have indicated an interest to take the other side of trades offered or **bid** into the stock market. Knowing that a large quantity of a particular issue is available to be sold may make another manager inclined to buy more of that issue, if it is already considered a target holding for that account. The managers are therefore looking for access to supply and demand information on particular issues. Portfolio trading systems that have procedures for maintaining lists of portfolios are handy for transmission and execution of this inter-manager trading.

Enhancing Cash Returns

The final institutional application is in the cash portion of the portfolio, where stock portfolios hedged with stock index futures are held when they offer prospective returns in excess of benchmark money market

rates. Stock index futures at times become overvalued, and an arbitrage trade between the equity and futures market can improve the returns on the cash segment of the portfolio. This strategy is most suitable to institutional investors with funds in indexed equity portfolios. A position in a stock index or bond, hedged with futures, should provide the short-term interest rate in effect until the expiration of the futures contract, taking into account the specific transaction and financing costs of the underlying stock index or bond position. Short-term supply and demand pressures specific to one market (futures or stock/bond) can send intermarket pricing relationships to levels where the implementation of a hedged position can improve returns.

Broker/Dealer Applications

Proprietary trading has become an important part of the revenue of investment banking firms as commission rate pressure has reduced the profitability of customer business. As members of stock and futures exchanges, brokers can implement trades for their own account at low cost. In addition, employees on the floors of these exchanges are able to quickly receive information. As investment professionals, they also have a great deal of expertise and experience in devising strategies to act on this information. Brokers also have direct access to portfolio trading systems they maintain for their customers. Finally, while facilitating customer trades they often acquire inventories of net long or short stock positions or over-the-counter option positions that must be hedged properly.

Portfolio and futures trades by broker/ dealers can therefore be both a part of their normal risk-management function and based on short-term market views developed from their access to information and trade flows. In any dealer market, the availability of hedging vehicles such as Treasury bond futures encourages more competitive market making and willingness to commit capital. Broker/dealers have the objective of maximizing the return of the deployment of that capital, whether it is to be used for customer trade facilitation or for investing firm positions when customer opportunities are not present or offer lower returns. Stock index arbitrage activity by broker/dealers is controversial because broker/dealers have a comparative advantage in the cost of executing the stock portion of the trade. There is also still an impression among many investors, particularly retail investors, that this activity distorts individual stock prices; others feel that existing stock market structures do not have the capacity to handle large amounts of this activity at times of market stress. Therefore, some broker/dealers refrain from proprietary stock index arbitrage with S&P 500 futures for these noneconomic reasons. This abstinence is likely to continue until exchanges develop products and procedures that are better able handle interportfolio and intermarket arbitrage and until the investing public gains a better understanding of the motivation and real impact of these strategies.

PORTFOLIO TRADING VEHICLES AND TECHNIQUES

Up to now we have primarily been discussing portfolio trading in the context of trading lists of stocks using the NYSE automated **order** entry system (SuperDot) and stock index futures. It is worthwhile to explore the features, advantages and disadvantages of each of these in more detail. In addition, alternative forms of portfolio trading exist, including Exchange for Physicals. Exchange stock Portfolios and Market Basket Securities, new methods of portfolio trading pending approval, are expected to debut soon at the New York Stock Exchange and Chicago Board Options Exchange.

As we have mentioned previously, many experts on financial markets feel the growth of the demand for simultaneous execution of groups of stocks has outstripped the capacity of existing market-making facilities to provide for such execution. This point was brought to light in many of the studies of the October 1987 stock market crash. The markets' inability to handle the large demands for portfolio and index futures trading without severe price adjustment was considered a contributing factor to the crash. However, the role of portfolio trading in the crash is inconclusive given

the fact that foreign stock markets, where very little portfolio trading is used, fell as much or more in price.

Nevertheless, the close study of stock-trading behavior that came out of post-crash investigations revealed the importance of such trading techniques to institutional market participants. At the time, several governmental and exchange studies and officials highlighted the need for more portfolio or "basket" trading vehicles, in addition to stock index futures, to minimize the impact of this form of trading on more traditional stock trading practices. The options exchanges (Philadelphia and American) responded with the Index Participation product; the NYSE and CBOE both developed proposals for trading a single unit representing portfolios of securities that would then be delivered through traditional stock-delivery procedures.

Portfolio Trades

The oldest and most established form of portfolio trading, existing since the early 1970s, involves the simultaneous execution of lists of stocks. Market folklore holds that these trades got their name because the contents of portfolios were stored on computers and printed out by running a program before they were given to the floor for execution. Originally these trades were hand-carried to the relevant execution post, but this required a great deal of manpower and incurred significant market risk. (This practice is used even today when other systems are unavailable). In 1975 the NYSE initiated the Designated **Order** Turnaround (DOT) system, which was designed primarily to handle retail trades of up to 2,099 shares in an individual issue. This system was upgraded in 1987 to SuperDot, which has processing capacity of up to 25,000 shares per issue. Market orders entered into DOT are transmitted electronically to the appropriate specialist post, and executions are reported back to the member firm's trading room in three minutes.

Brokers use DOT to transmit lists of orders required for portfolio execution to the floor and to receive execution reports. They connect the DOT system to their own **order** processing software to make the handling of these trades even more automatic. Portfolio orders for more than the maximum trade size acceptable by DOT could easily be broken into slices consistent with the system specifications and typical market liquidity. The American Stock Exchange and NASDAQ systems also developed automatic **order**-routing systems, so an S&P 500 portfolio could be executed within minutes. Portfolio trading through the DOT system is the best means of handling nonstandard baskets, lists of stocks to be bought and sold by active stock managers, and small portfolio rebalancing trades involving reinvestment of cash dividends.

The current capacity of the most sophisticated portfolio trading systems permits broker/dealers to deliver several thousand orders per minute. They can handle other types of orders in addition to market orders, such as limit orders, buy on a minus tick, and sell on a plus tick. Some brokers have permitted direct access to their portfolio trading system to select institutional customers and have added analytics for strategy development and trade-execution evaluation.

Table 1 shows the statistics on portfolio trades at the NYSE utilizing the DOT system for the year ending June 30,1989. On average about 10 percent of a typical day's trading volume was represented by such trades, and about half of these had a related index futures transaction. Some 68 percent of the trades were executed on behalf of customers on either an agency or guaranteed basis; the remaining 32 percent were conducted for the firm's own trading account.

Despite the existence of automated facilities for receiving program trades, the actual market making in equities is still essentially done on a stock-by-stock basis. At the NYSE each specialist has a diversified book of issues, but this book has substantial tracking error relative to an index and cannot be hedged easily with existing index futures contracts. The specialist sees the component parts of a portfolio trade that concern his issues and must treat the portfolio trader in the same way as any other

stock **order** being received via the DOT system. However, in deciding on a **price** at which to execute the **order**, the specialist has **information** relating to the aggregate **market** and limit **order** flow in that stock and has more difficulty hedging the execution risk than does the upstairs portfolio market maker or the customer who initiated the transaction. Moreover, two customers (or a customer and broker/dealer) who wish to cross a matched portfolio trade cannot do so while the NYSE is open without the specialist's intervention. Such crosses can occur, however, in large blocks of individual stocks. Recently, the NYSE proposed a new market-on-close **order** that will allow for crosses to occur at the closing price of each stock.

One of the motivations for the development of new portfolio trading vehicles is to allow for a two-way market to be made in baskets of securities, in which the specialist or market maker will be one participant. With portfolio trades conducted on the DOT system, it is extremely difficult to assess the aggregate amount of portfolios to be bought or sold at various index levels. Better guidance for this supply and demand pressure is provided in the index futures market.

Index Futures Trading

Futures trading on stock indexes began in 1982 when provision for cash settlement of futures was made and the SEC opened the door for derivative securities to trade on portfolios of stocks. A future on the Value Line index was introduced by the Kansas City Board of Trade in February 1982, and one on the S&P 500 was introduced in April 1982. In the U.S., futures also trade on the NYSE index and on the Major Market Index, a clone of the Dow Jones Industrial Average. The S&P 500 future is by far the most actively traded, representing some 85 percent of dollar value of index-derivative trading.

From an institutional perspective, a synthetic index portfolio position can be created by a long position in an index future combined with the holding of a money market instrument. The gains and losses on the futures position should mimic those of an index portfolio. Futures pay no dividends, but the net of the interest earned on the money market portfolio and the dividends foregone by holding the future are reflected in the futures price, so the total returns of the two positions are equivalent when futures trade at their fair value. In the instances when futures trade cheap, the returns of the futures position and money market portfolio should be in excess of what could be earned on a portfolio consisting of the underlying stocks.

On a typical day, the volume of portfolio trading occurring in U.S. futures markets is about 125 percent of the dollar volume of NYSE trading-$74 billion $7.4 versus $6 billion for the first six months of 1989. Since program trades are only 10 percent of NYSE volume, the index futures markets manage a flow of "synthetic" portfolio trades some 12 times that of the NYSE in a trading session. An S&P 500 futures contract represents $165,000 of stock value and (in commission terms) with the S&P 500 at 345 and costs less than 10 percent of the stock commission on a comparable size portfolio trade executed on SuperDot. Therefore, in terms of both cost and liquidity, the index futures markets have a considerable competitive edge as a means of adjusting overall exposure to the equity market.

Futures trading is conducted via open outcry in a trading arena where each competitive market maker owns his own seat. Almost half of the trading activity is intra-day trading by these market makers, a feature very different from the typical stock exchange. Open interest reflects positions open at the end of any trading session and thus is a measure of institutional and retail customer use as opposed to trade facilitation by market makers. Figure 2 shows the average open interest and volume in S&P 500 futures over the last several years. The. growth in open interest shows the increasing use of index futures as a surrogate for long and short S&P 500 portfolio positions.

For asset allocation adjustments and initiation of short-term

synthetic positions in the equity market, futures offer ease of execution, much lower execution costs, and leverage when desired. Futures do have some operational disadvantages, however. Because these markets have a separate regulatory structure, futures trading requires a separate account so funds associated with futures trading can be segregated from those used for stock executions. In addition, futures gains are passed daily from losers to winners, placing more cash flow requirements on futures traders than on stock traders–for whom gains and losses are unrealized until the position is closed. Futures also represent only standardized baskets and expire periodically. As a contract approaches expiration, the portfolio manager must decide to switch back into stocks (or cash) when the position expires or roll forward to the next contract. The pricing of the roll or calendar spread trade can work for or against the trader and introduces some risk and reward opportunity to the synthetic index trade with futures.

Index futures trading can now be conducted globally; index futures trade in Japan, the U.K., France, Australia, Singapore (on a Japanese index), Canada, Hong Kong, and New Zealand. The CFRC has not yet approved several of these contracts for U.S. investors, but local money managers have come to use their index futures in much the same fashion as U.S. money managers have become acclimated to S&P futures applications.

Stock Index Arbitrage

The strategy of stock index arbitrage is conducted through offsetting positions taken in index futures and a stock index portfolio to capitalize on discrepancies in the relative prices of positions. When futures are cheap, they are purchased while stocks are sold in what has come to be called a "sell program." The opposite trade, used when futures are "rich," is a substitute for a money market position and involves selling futures against a stock portfolio purchased with a "buy program." Because stock index arbitrage involves both selling and buying index portfolios, there should be no net directional effect on either market in excess of closing the spread between the fair and actual value of the futures contract. Because the stock side of the trade has an uncertain market impact, depending on the number of other orders hitting the flow simultaneously through the DOT system, traders allow for some slippage in deciding when to initiate an **order**. A shortage of liquidity in comparison to the volume of arbitrage trades attempted to be executed at a particular point in time can result in a price reaction that would also reduce the profitability of the trade. One of the appeals of Exchange for Physical (EFP) trades discussed below is the ability to control the market impact through a two-party matched execution.

Exchange for Physicals in S&P 500 Futures

Another portfolio trading mechanism that has been in use for some time during off-exchange hours is the Exchange for Physicals market. Futures trading rules allow a holder of a futures position to swap out of that position for the underlying instrument at a negotiated basis level (spread between futures and underlying price) after the futures exchange is closed. The trade must occur between two parties and be reported to the exchange where the contract is traded.

The EFP provision has been used by dealers for facilitating customer trades into and out of index futures positions at preset basis levels. The advantage for the customer is that he or she can swap out of a long futures position into an S&P 500 portfolio in one trade knowing the all-in cost up front. The stock part of the trade is crossed in London as a book entry. NYSE rules allow for trading in NYSE issues off-exchange when the NYSE is closed. From the dealer's perspective, a significant advantage in this type of trade is that stocks sold short in exchange for a futures position are not subject to the plus-tick rule in force in the NYSE. There is, however, no central marketplace for EFPs. To find the direct market, investors must survey dealer firms for indications of basis levels that will ultimately be negotiated between the two parties to the trade.

EFPs are quoted in terms of the basis of futures premium over the index. For example, a dealer may be willing to sell stock in exchange for

futures at 3.20 S&P points over the index close; alternatively, the dealer may be quoting an EFP trade to sell futures and buy stock at a 3.60 premium to the index. Dealers will typically price their EFP market in relation to the fair value of the future using their financing rate and based on current inventory or risk-management needs. Because the stock side of an EFP trade usually occurs in London, it is not reflected in NYSE volume figures; however, the volume is reported in the program trading statistics collected monthly by the NYSE.

change Stock Portfolios and Market Basket Securities

e NYSE's and CBOE's responses to the call from the SEC for more index-trading vehicles are new trading mechanisms rather than separate investment products. With an Exchange Stock Portfolio (ESP) or Market Basket Security (MBS), a portfolio trade of 500 stocks is effectively executed in a bundle with one **order** that is settled with physical delivery of 500 stocks.

In the NYSE's version of this product, a group of competing market makers, one of which is the aggregation of specialists' bids and offers, will be quoting **bid** and **ask** prices on the S&P 500 index.
All market makers will have access to the electronic **order** book. The benefit of ESPs and MBSs is the availability of an S&P 500 basket to be traded as a single unit in a competitive market-making environment. This should make the market for standard S&P 500 portfolios more efficient and less costly compared to implementation via the SuperDot system.

The ESP will be large (about $5 million) and contain odd lots of S&P 500 issues. As an incentive to create a tight and liquid market, the ESP will not be subject to the plus-tick rule that permits the selling of individual stocks only on prices higher than the last sale. The S&P 500 futures should remain the most liquid, continuous market for portfolio trades and should actually increase in volume with the existence of ESPs. Because of the size of the ESP, it is unlikely that there will be continuous activity in these baskets; rather the facility will be used primarily at the open and close, and for crosses or arbitrage within the trading day Arbitrage **bands** between the futures and ESP index **quote** will tend to be narrower because of the ease of executing the arbitrage trade when an explicit underlying vehicle exists. The future will continue to be used by broker/dealers as the natural and lowest-cost hedge for the ESP, much as it is now for an S&P portfolio trade execution.

The success of ESPs and MBSs has yet to be determined. Portfolio trading index futures and stock index arbitrage, having survived the October 1987 market turmoil, now appear well entrenched. Another sign of the permanence of portfolio trading is the eagerness with which non-U.S. investors are using this strategy and index futures markets. A period of change and innovation always brings some striking successes and some dismal failures. New products are rarely accepted with open arms by those involved with the products they replace or whose volume they reduce. The survival of a new product ultimately depends on whether it fulfills a customer need better and at a more competitive price than currently available products. So will it be with portfolio trading services as they continue to experience growth, innovation, and, not surprisingly, controversy.

Figure 1

Portfolio and Index Derivative Applications

Institutional Investor(1)

- Overall Fund or Plan
- Shifting the asset mix
- Maintaining a target asset mix
- Portfolio insurance
- Moving funds from one manager to another
- Handling large contributions or withdrawals
- Terminating plan
- Stock Segment
  - Passive equity management
    - Investing cash flows and dividends

Swapping between stocks and cheap stock index futures
Active equity management
Purchasing a list of attractive issues
Disposing of a list of unattractive issues
Supplying liquidity to other active managers
Cash Segment
Buy stocks and sell futures to create synthetic cash (arbitrage)
Broker/Dealer
Arbitrage Desk
Buy index/Sell futures
Short index/Buy futures
Block Desk
Hedge a guaranteed portfolio execution
Hedge an aggregate equity position
Risk Management Desk
Hedge a short or a long OTC index option obligation

1. Pension fund, mutual fund, money manager, insurance, endowment, nonprofit institution.

Table 1
NYSE Program Trading Statistics

Program Trading Relative to NYSE Volume (shares and volume in millions)

	Program Trading Shares	Program Trading	NYSE Volume	Traded at NYSE	Traded in Other Markets	Traded in Foreign Markets
Average	0.4	10.2%	158.3	76.5%	5.4%	18.1%
7/88 -12/88	20.8	10.7%	148.3	76.0%	7.8%	16.2%
1/89 -6/89	19.9	9.7%	168.2	77.1%	2.9%	20.1%

NYSE Program Trading Strategies

	Index Arbitrage	Other
Average	49.3%	50.7%
7/88	50.2%	49.9%
1/89 -6/89	48.5%	51.5%

NYSE Program Trading by Source

	Principal	Customer Facilitation	Agency
Average	32.4%	17.3%	50.3%
7/88 -12	27.4%	16.3%	56.3%
1/89 -6/89	37.4%	18.3%	44.4%

Captions: Portfolio and index derivative applications. (table); NYSE Program trading statistics. (table); S&P futures open interest vs. volume average 1982-June 1989. (graph)

Special Features: illustration; table; graph
Company Names: New York Stock Exchange Inc.--Economic policy
Industry Codes/Names: BUS Business, General
Descriptors: United States. Securities and Exchange Commission--Economic policy; Program trading (Securities)--Finance; Portfolio management--Technique; Futures-- Finance; Stocks--Purchasing; Portfolio insurance--Finance; Stock-exchange-- Economic policy ; Stock Market Crash, 1987--Economic aspects
Product/Industry Names: 6231 Security and commodity exchanges

File Segment: MI File 47

? **DS**

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Set   File    Items   Description
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S1                0   AU=ALMEIDA,C?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S2                0   AU=LUSSIER, A?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S3                0   AU=LOGUE,J?
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S4                0   AU=FALONI,D?
        9   1785600
       15   3128136
      160         0
      148  10389423
      275   1052988
      610   1501764
      810         0
S5         17857911   PD>20030129
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S6                0   (QUOTE AND ORDER) (25N) ((BID AND ASK) () (INFORMATI-
                  ON)) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMEN-
                  SION))
        9         0
       15         0
      160         0
      148         0
      275         0
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      610         0
      810         0
S7                0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION-
                  )) (25N) ((CONCENTRIC (5N) BANDS) (10N) (SIZE OR DIMENSI-
                  ON))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S8                0   (QUOTE AND ORDER) AND ((BID AND ASK) () (INFORMATION
                  OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BANDS) (-
                  25N) (SIZE OR DIMENSION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S9                0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                  ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                  S) (25N) (SIZE OR DIMENSION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S10               0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                  ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) (RIN-
                  GS OR BANDS)) (25N) (SIZE OR DIMENSION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S11               0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                  ION OR DATA)) (25N) (((CONCENTRIC OR CIRCULAR) (5N) BAND-
                  S) (25N) (SIZE OR DIMENSION))
        9         0
       15         0
      160         0
      148         0
      275         0
      610         0
      810         0
S12               0   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                  ION OR DATA)) AND (((CONCENTRIC OR CIRCULAR) (15N) BANDS)
                   AND (SIZE OR DIMENSION))
        9        15
       15       428
      160         0
      148       184
      275        21
      610         4
      810         0
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S13             652   (QUOTE AND ORDER) AND ((BID AND ASK) (10N) (INFORMAT-
                        ION OR DATA))
          9      84
         15     363
        160      39
        148     546
        275     111
        610      25
        810       9
S14            1177   (CONCENTRIC OR CIRCULAR) (15N) (RINGS OR BANDS)
          9     129
         15    3883
        160       0
        148     849
        275     108
        610      23
        810       3
S15            4995   (QUOTE AND ORDER) AND (BID AND ASK)
          9       0
         15       2
        160       0
        148       0
        275       0
        610       0
        810       0
S16               2   S14 AND S15
          9       0
         15       0
        160       0
        148       0
        275       0
        610       0
        810       0
S17               0   S16 NOT S5
          9    2262
         15   10429
        160    1372
        148   22057
        275    1620
        610    4370
        810     899
S18           43009   MARKET (10N) PRICE (10N) (DATA OR INFORMATION)
          9     129
         15    3883
        160       0
        148     849
        275     108
        610      23
        810       3
S19            4995   QUOTE AND ORDER AND BID AND ASK
          9     169
         15     958
        160      11
        148    1526
        275     239
        610     191
        810      58
S20            3152   (BAND? OR RING?) AND S18
          9       4
         15      22
        160       0
        148      28
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       275          8
       610          0
       810          0
S21                62   S19 AND S20
         9          0
        15          3
       160          0
       148         13
       275          7
       610          0
       810          0
S22                23   S21 NOT S5
         9          0
        15          3
       160          0
       148         13
       275          6
       610          0
       810          0
S23                22   RD  (unique items)
         9         73
        15        565
       160          6
       148        829
       275        119
       610         70
       810         24
S24              1686   (BAND OR BANDS OR RING OR RINGS) AND S18
         9         73
        15        565
       160          6
       148        829
       275        119
       610         70
       810         24
S25              1686   S24 AND S20
         9         73
        15        565
       160          6
       148        829
       275        119
       610         70
       810         24
S26              1686   S24 AND S18
         9          1
        15          7
       160          0
       148         21
       275          7
       610          0
       810          0
S27                36   S19 AND S24
         9          0
        15          2
       160          0
       148          8
       275          7
       610          0
       810          0
S28                17   S27 NOT S5
         9          0
        15          2
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       160          0
       148          8
       275          6
       610          0
       810          0
S29                16   RD  (unique items)
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